DOCUMENT RESUME

ED 259 913 SE 045 884

AUTHOR	Schenck, David, Ed.
TITLE	Science, Philosophy & Religion. Working Papers Series Volume 1.
INSTITUTION	Lehigh Univ., Bethlehem, PA. Technology Studies Resource Center.
PUB DATE	Aug 84
NOTE	117p.
AVAILABLE FROM	TSRC, Lehigh Univ., 327 Maginnes Hall #9, Bethlehem, PA 18015 ($6.00 each, prepaid).
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Beliefs; Epistemology; *Ethics; Higher Education; Judaism; Moral Values; *Philosophy; *Religion; Science History; *Sciences; *Scientific and Technical Information; Social Change; Technological Literacy; *Technology

ABSTRACT

Lehigh University Technology Studies Resource Center has coordinated and produced a series of publications that focus on expanding an understanding of the social context of technology in contemporary society. This volume is the first in a series of working papers that aim to stimulate new research, facilitate dissemination, encourage peer review, and increase opportunities for publication in formal journals. The papers were prepared for a lecture series sponsored by the Religious Studies Department, Philosophy Department, and Science, Technology and Society Program of Lehigh University. They include: (1) "On the Incommensurability of Science and Religion" by Steven Goldman; (2) "Cultural Evolution and Religious Truth" by Donald Campbell; (3) "William Prout (1785-1850) and His Hypothesis: The Religious Dimension in Grand Unified Theories" by John Speller; (4) "Jewish Responses to Technology and Science" by Daniel Lasker; and (5) "Science and Religion: Conflict and Partial Reconciliation" by Norman Melchert. (ML)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

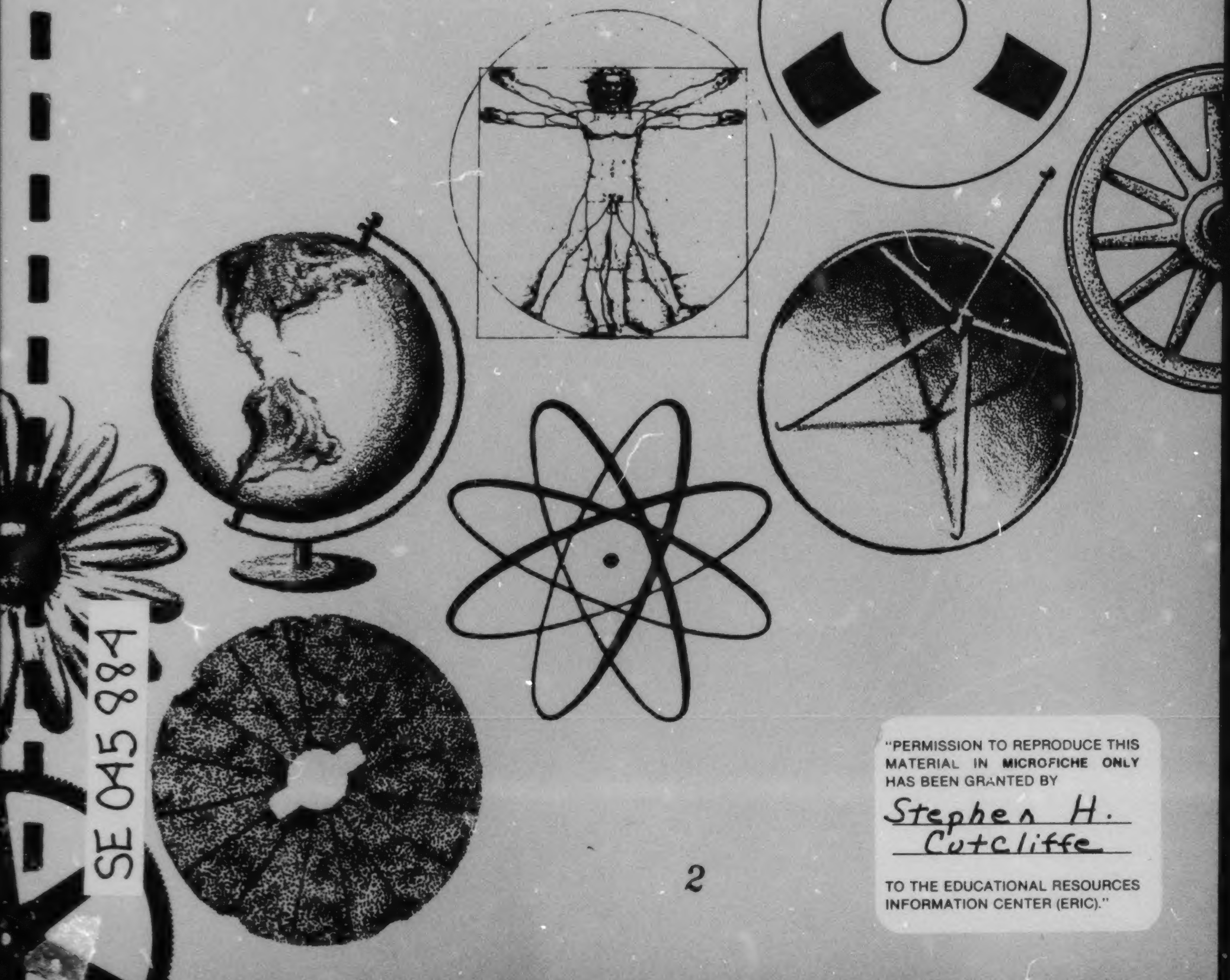
ED259913

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

BEST COPY AVAILABLE

Working Papers
Technology Studies Resource Center
Lehigh University

SCIENCE, PHILOSOPHY
&
RELIGION



SE 045 984

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Stephen H. Cutcliffe
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

TECHNOLOGY STUDIES RESOURCE CENTER

WORKING PAPERS SERIES

Stephen H. Cutcliffe, Editor

VOLUME 1, AUGUST 1984

SCIENCE, PHILOSOPHY
&
RELIGION

David Schenck, Issue Editor

Introduction iii

Preface v

On the Incommensurability of Science and Religion
Steven L. Goldman 1

Cultural Evolution and Religious Truth
Donald T. Campbell 25

William Prout (1785-1850) and His Hypothesis: The Religious Dimension in Grand Unified Theories
John L. Speller 45

Jewish Responses to Technology and Science
Daniel L. Lasker 65

Science and Religion: Conflict and Partial Reconciliation
Norman P. Melchert 91

Technology Studies Resource Center
Maginnes Hall #9
Lehigh University
Bethlehem, Pennsylvania 18015

INTRODUCTION

"Science, Philosophy and Religion" is the first volume of a projected, ongoing series of working papers to be published by Lehigh University's Technology Studies Resource Center. The publication of this working paper series in association with a Colloquium for Technology Studies, which will serve as the major source for future volumes in the series, is designed to help foster a regional research community in the field. The publication and distribution of papers from each colloquium in a working papers format will stimulate new research, facilitate wider dissemination, encourage peer review, and increase opportunities for these papers to be selected for subsequent publication in formal journals and anthologies after appropriate revision.

The Colloquium for Technology Studies and associated working papers series are coordinated by Lehigh University's Technology Studies Resource Center. The TSRC is engaged in the creation and dissemination of materials and programming that will lead to a greater understanding of technology on the part of a wide range of audiences, especially their understanding of the mutual interaction of technology and social institutions and values. Among other functions, the Center serves as a focus for academics from all disciplines to collaborate in pursuing research and educational opportunities in technology studies with academic colleagues and in conjunction with non-academic sponsors. The regional colloquium and working papers series are just two vehicles within the Center's many activities that will help to expand our understanding of the social context of technology in today's world.

Special thanks are due to Prof. David Schenck of Lehigh's Department of Religion Studies for coordinating the lecture series from which the papers in this volume were drawn and for serving as the editor of this inaugural issue. Thanks are also due each of the participants for agreeing both to speak and to have their papers published in this working format. Finally, we are particularly grateful to Mary Ann Orsinger not only for her excellent typing of the manuscripts but more importantly for her ability to retrieve them from the word processor in printable format.

Comments or queries on the Working Papers Series, the Colloquium for Technology Studies, or the Technology Studies Resource Center would, of course, be welcome and may be forwarded directly to me.

Stephen H. Cutcliffe, Series Editor
Director, Technology Studies Resource Center,
Lehigh University

PREFACE

The papers which constitute this first volume of the Working Papers of Lehigh's Technology Studies Resource Center were originally prepared for a lecture series entitled "Science, Philosophy and Religion". This series was held at Lehigh University during the fall of 1983 and winter of 1984 and was sponsored by the Religion Studies Department, the Philosophy Department, and the Science, Technology and Society Program.

Professor Goldman's paper serves well as an introduction to this volume, for in it he surveys skillfully the history of the conflict of religion and science. Of particular note is his argument that the modern conflict between science and religion can only be properly grasped if understood as a development out of the medieval conflict between religion and philosophy. (Ironically, as Goldman shows us, after science disowns the philosophy that nurtured her, philosophy takes its "revenge" on science by establishing two new sub-disciplines: the history and philosophy of science.) Goldman also claims that the conflict of religion with philosophy and science arises out of the incommensurability of the reason and the will. This argument provides a useful rubric for viewing the papers that follow.

The very authority which Goldman indicates scientists will inevitably claim in matters of the will is at once excoriated and exemplified in Professor Campbell's functionalistic, evolutionary account of the moral impulse and its religious underpinnings. Especially interesting is Campbell's warning to his fellow social scientists concerning the corrosive impact of their examination of the moral life, a warning derived from Campbell's own epistemological studies as well as from "moral impulses".

Professor Speller gives us a fascinating historical account of the career of William Prout, of the fortunes and misfortunes of Prout's Hypothesis, and of the remarkably astute conjectures related to contemporary unified field theories made by Prout. After guiding us through Prout's Bridgewater Treatise entitled "Chemistry, Meteorology and the Function of Digestion considered with reference to Natural Theology", Speller asks us to consider whether all grand theories of the unity of the world do not rest, in some fashion, on the religious notions of design and purpose. This is not an argument that science and religion are compatible; rather, it is an example that shows something of the complexity of the theoretical imagination.

Professor Lasker reviews various moments in the history of the Jewish people where the conflict between religion and technology, and religion and science have been significant. Working from the perspective of "halakhic Judaism", Lasker describes technological advances which have made the observance of the Law easier (the "Grama-phone", Sabbath clocks and Sabbath elevators), and those which raise complex issues of observance (artificial insemination). Science and philosophy on the other hand, Lasker claims, are much less problematic halakhically, for they involve innovations of theory not practice.

Professor Melchert, too, turns to the contrast of the world imaged through the will, which demands a moral response, and the world imaged as lawful, which is to be understood through the exercise of reason. He sorts out this conflict into two: one of disagreement over "method", and the other over "contents". Melchert argues that the scientific "method", for example, could easily have yielded a religious "content", the existence of a teleological universe. This did not happen, however; and Melchert argues, contra Goldman, that we must perforce choose between the worlds imaged by science and religion, as well as between their methodological ideals: independent inquiry and the appeal to authority.

Each reader will doubtless have his or her own interests to pursue in reading these papers, but I would like to call attention to one issue, often rather suppressed, that I think this series of papers brings to the fore. The issue is that of the cultural authority of science in a post-religious age. By "post-religious" I mean nothing controversial -- just that religious institutions and discourses no longer dominate the culture's life, its art and its politics, as well as its sexual mores, its psychologies and therapies, its cosmologies. (This claim I make in spite of the apparent revival of religion in the United States. For the most part this revival is confined to the private sphere; and where it does come into the public sphere in the form of politics, it enters that arena as one special interest group among others.) The conflict between science and religion has, over the past two hundred years, most often been taken by scientists and philosophers alike to be primarily an epistemological one. As the papers here make clear, there is a moral dimension to the conflict as well. In particular, there is raised a vital question about the nature of moral authority.

Especially fascinating is the appearance of scientific models that claim to buttress the very moral authority which science has served to undercut (see Professor Campbell's paper). The viability of this recurrent strategy of modern intellectuals is questioned by those who stress the seemingly eternal conflict of reason and the will, of inquiry and authority (see Goldman and Melchert).

With this in mind, we might close with a Nietzschean thought or two. Asking himself whether it was really science that opposed religion in today's culture, Nietzsche answered, "No". In his Genealogy of Morals he claimed that science, and the atheism it often sponsored, were the latest permutations in the evolution of ascetic ideals in Western culture, ideals we have long been familiar with in their religious guise. Science, with its faith in a single and "divine" truth, is the new metaphysical faith (see Speller). And it is for this reason that science now assumes such an easy authority for us in the culture -- not because it can give us any guidance in moral issues. Indeed, Nietzsche argued that science cannot create values, but can only serve moral authority already established by poets and prophets. If this is the case, Nietzsche said, then we must raise the question of the value, the cultural and moral value, of our beloved science. It is not, however, to discredit either manifestation of the ascetic spirit -- the religious or the scientific -- that Nietzsche wrote. Rather, he wrote to show us the dramatic necessity for moving beyond the "conflict" of science and religion to recover some calculus for the transformation of our lives. And knowing that our science has lead us to think that all discoveries come from the pursuit of novelty, he reminds us: "Not that one is the first to see something new, but that one who sees as new that which is old, long familiar, seen and overlooked by everybody, is what distinguishes truly original minds."

David Schenck
Department of Religion Studies
Lehigh University

On The Incommensurability of Science and Religion*

Steven L. Goldman

1. Science and religion are incommensurable. There is, in my view, no rationally formulable ground common both to science and to religion, taking these terms to refer to modern science and, in the first instance at least, to Christianity. I will also take them to refer to science and religion as we have them, as they are practiced and not as they "really are", or as they could be or should be practiced.

Science and religion are distinct enterprises, and yet they are in essential conflict with one another. The resolution of this paradox seems to me to lie in recognizing that science and religion are expressive of reciprocal responses to experience. An illustration in science of this sort of relationship is the relationship between non-commuting variables in Heisenberg's version of quantum mechanics. Certain pairs of parameters of physical systems (the pair position-momentum and the pair energy of an event-time of occurrence of that event), but only those pairs, are so structured that measurement of the value of one member of the pair implicates the value of the other. This is the basis of the so-called Uncertainty Relations, which identify the form of this implication and quantify the limits of the accuracy with which just these measurements can be made.

---

*An earlier version of this paper was given at Haverford College in March, 1984 as part of a year-long colloquium entitled "Science, Faith and Rationalities". I wish to thank Profs. Ashok Gangadeen and Richard Bernstein of Haverford, the first for the invitation and supportive insights drawn from his own related work, the latter, in his role as commentator, for ultimately constructive criticisms. I also wish to thank Dr. David Schenck of Lehigh and Dr. Emily Passow of St. Joseph's University for reading and commenting on the revised version.

In an analogous way, science and religion seem to me to be correlated in such a way that adopting the one posture necessarily implicates the other. The overt form of this implication is tension, the "deep structure" of which would appear to be an ineluctable conflict between reason and will. This conflict is mediated, in the case of science and religion, by the exclusive yet mutually implicating postures of independent intellectual inquiry and an act of will that are respectively characteristic of science and of religion. Adopt the posture of independent intellectual inquiry, and the act of submission characteristic of religion inevitably seems craven. Adopt the posture of personal submission to an external source of truth, and the form of the pursuit of truth characteristic of science must appear willful and arrogant. At the same time, precisely because reason and will are co-related responses to experience, neither can be adopted without evoking at least the spirit of the other.

This suggests that, because philosophy is both in principle the embodiment _par excellence_ of independent intellectual inquiry and in fact the historical ground of modern science, the relationship between science and religion needs to be approached by way of the broader relationship of philosophy to religion. This interpretation in turn implies a need to understand the relationship between philosophy and science, if only to avoid stumbling over the _débris_ left by the development of philosophy of science, a subdiscipline of philosophy whose emergence in the nineteenth century was expressive of a maturing conflict between science and philosophy. This conflict was contemporaneous with, but quite independent of, an intensifying conflict between science and religion; and the two conflicts illuminate one another.

No one promised that this was going to be quick _or_ easy!

2. We agree, I suppose, that science and religion are at least apparently in conflict. One thinks readily enough of Copernicus' reluctance to publish and of Luther's and Melanchton's contumely; of Osiander's preface to the _De Revolutionibus_ (expressive of his sensitivity to imminent religious objections) and of the ultimate prohibition of the work to Catholics by the Congregation of the Inquisition; of the burning of Bruno and the trial of Galileo (both far more complex events than a casual reading of the history of science is likely to reveal); of the anti-clericalism of the Enlightenment, and the clerical opposition to the materialistic determinism that was the concomitant of the emergence of mechanics as the Queen of the sciences, together with opposition to the developing views in eighteenth and nineteenth century geology and biology concerning the antiquity of the earth and evolutionary accounts of life; of the open warfare between science and religion that marked the second half of the nineteenth century, whose echo in the Scopes trial still sounds clear in the vigor of the Creationist campaign against evolutionary biology and, by implication, against any scientific

theory not directly reducible to facts [that is, against all scientific theories].

The overt conflict between science and religion is tied to the explicit materialism of modern science in company with its conviction that discursive reason is capable of yielding an exhaustive account of reality. In the course of the period 1650 to 1850, science offered increasingly sophisticated, increasingly powerful accounts of physical, chemical, biological and geological phenomena, of human physiology, psychology, sociology and cultural anthropology, including language, art and religion within the domain of anthropological phenomena. The various sciences were by no means monolithic with respect to ontological interpretations of the products of science, and even in the Age of Reason there was active cultural opposition to the exclusive materialism of science from the side of a wide spectrum of spiritualist agitators. Nevertheless, it is both accurate and correct to see in the work of Laplace, for example, an authentic expression of the perfection of modern science. The Sphere of Being becomes a finite array of material particles interacting in a thoroughly deterministic manner, the discovery of which is open to reason without limit. The cosmic intellect that Laplace imagined, before which past and future collapsed into the eternal present of the equations of motion of the whole, was only extensively different from our own intellects when we practiced science.

This metaphysical interpretation of science, commonly called scientism, necessarily roused passionate hostility from the side of religion. It left no room for the spiritual to be, let alone to act. It reduced human being, step by step and system by system, to the being of a machine, a machine enlivened by wonderfully subtle and complex physical and chemical processes to be sure, but a machine nevertheless. Concurrently, scientism roused the hostility of elements in Western culture other than religion. It roused those for whom logic and objectivity did not exhaust truth and who denied the ultimately rational character of reality. For these people, imagination, intuition, chance, violence, irrationality and history depicted as "irruptive" [Foucault's term] were the guarantors of freedom, of the reality of subjectivity and the domain of spirit, of the human. A later generation could have said that just these irrational aspects of reality guaranteed a place for values in a world science wanted to reduce to fact.

Scientism roused one more enemy: philosophy. Where philosophy in the High Middle Ages was the seedbed of modern science, generating its basal conceptual commitments and fashioning, albeit rudely, its elementary conceptual tools; and where science in the seventeenth and early eighteenth century was called by philosophy's name and was universally acknowledged as its wunderkind; by the late eighteenth century scientists began to distance themselves from the speculations of the philosophers. By the early nineteenth century the name "scientist" was created and the term "to philosophize" increasingly was used pejoratively by scientists. Science, in the course of the nineteenth century, arrogated to itself the title "locus of truth". By a curious but far from inexplicable turn, science turned on the philosophy that had nurtured it, just as philosophy, 500 years earlier, had turned on theology. The response of the philosophers was to launch a critical inquiry into the nature of science and the status of its truth claims, an inquiry that was to define a new subdiscipline: philosophy of science.

3. Now, however interesting this may be, what is its bearing on the problem of the relation of science to religion? At the start of the preceding section, I wrote that I supposed there would be general agreement that science and religion were at least apparently in conflict. The question that presents itself is this: is the conflict only apparent and is it resolvable, or is it real and irresolvable? The course of development followed by modern science, its evolution from seventeenth century nature philosophy to nineteenth century scientism, indirectly occasioned one basis for arguing that the conflict was only apparent. This basis was positivism in its various forms, forms whose common denominator was a non-metaphysical interpretation of the products of science. Whether in the hands of Comte, or Mach, or the James-Dewey pragmatists, or the conventionalists such as Duhem or Poincare, the object of science was, on this view, not a mind-independent external reality. Reinforced by the writings of Bohr and Heisenberg and their followers to the effect that subjectivity and objectivity can only arbitrarily be distinguished within thought and that science has as its object our experience of nature rather than nature itself, the route was open to arguing that science and religion were not truly in conflict. Science

and religion were doing two radically different things. Science was intent upon responding to our experience of nature in a particular, highly structured way ultimately justified in utilitarian terms. (These came, after Polanyi, Hanson and Kuhn, to include the satisfaction of criteria flowing from the social-political organization of the intellectual life of the scientific community.) Religion, by contrast, was intent upon carrying us beyond ourselves, beyond experience, to contact with an ordinarily unexperiencable Reality. This was beyond the competence of science which, for many who held this "positivistic" view, was often characterized as a particularly elegant and open-ended intellectual game.

As if to complicate the matter further, interpretations of religion developed in the course of the nineteenth century that paralleled these anti-metaphysical interpretations of science. The "God is dead" movement was one symptom of this, but so were latitudinarian responses to critical studies of Biblical texts and to the early results from archaeological and anthropological research. On these views, all religious teachings were true in a symbolic, non-literal, sense and false in a strictly literal sense. All were culturally and historically conditioned refractions of universal spiritual insights. Religion could thus take its place alongside science, and alongside art and literature, to mention only these, as together providing a more complete account of human experience than any one of these could provide. Of course, there were conflicts between these accounts and perhaps even some inconsistencies within each, but this only paralleled the situation within physics. There, Bohr argued, a complete account of phenomena could be given only if we allowed intrinsically conflicting conceptual categories to be used to generate complementary explanations of the same phenomenon.

We can, I think, readily understand the historical development of these conceptions of science and of religion as responses to developments within science (non-Euclidean geometry, thermodynamics, statistical mechanics, mathematical logic, relativity theory, quantum mechanics), outside of science (the philosophical critique of science extending from Whewell, Comte and Stallo through Bergson, Whitehead, and the logical positivists to the historical and sociological critique of science that has dominated the post-World War II period; not to mention the resurgence of subjectivist motifs in Western art, literature, music and politics) and within religion studies of a critical sort. Nevertheless, however satisfying these interpretations have proven to be for some, I believe that for the overwhelming majority of practitioners, science and religion as practiced do not match this "cool", positivistic, depiction of them. The practice of science is shot through and through with what gives every evidence of being deep realist commitments on the part of scientists. After the fact, that is, divorced from the doing of science, but only so divorced, the products of science are interpretable positivistically.

Attempts to reduce the products of science -- laws, hypotheses, theories -- to elements of experience in a way that avoids realist commitments continue to be a rich source of controversy among philosophers of science. In each case, in my opinion, it remains the case that these attempts almost always set aside the practice of science and deal only with the products. That the products lend themselves to a non-realist interpretation does not at all entail the non-realist character of the process by which those products were generated. The history of atomic and nuclear physics and chemistry in the past 100-150 years strongly suggests the legitimacy of this distinction. Again and again during that time controversies have raged over the reality of central postulates that could have been interpreted positivistically -- the atom, the molecule, the aether, the electron, the proton, the neutron, the neutrino, anti-matter, the meson, the photon, for that matter electric, magnetic, electro-magnetic and gravitational fields. Each time the resolution of these controversies has taken a metaphysical, that is, a realist form, the form of attributing real existence to the particles, the fields and the forces involved. Though the story is an extraordinarily complex one, this is just as true of the more recent history of quantum field theory, which now seems poised to fashion a world picture in physical terms.

Similarly, for the overwhelming majority of people we commonly consider religious, what they believe, they believe to be True, in general to the exclusion of what people of different religions believe. As the daily news only too well documents, the behaviors of religious people fully conforms to the realist commitments that are integral to the practice of religion. There doesn't seem to be any point to belaboring either of these observations, nor does it accomplish anything to dismiss these people, whether scientists or religious, as "rednecks". As we have them, as they are practiced, science and religion conflict with one another at least because both claim to be disclosing reality and truth insofar as these are accessible to human beings and are relevant to their behaviors.

At the same time, arguments that the conflict between science and religion is only superficial because the two, even conceding the realism of both, address distinctive domains of experience also seem to me to be weak. Science, this view argues, is concerned with generating an intellectually gratifying account of a world outside our selves. The object of science _is_ establishing the truth about the world in which we find ourselves; but this is a passive truth, a correct rendering of the dictionary and the rules governing the language of reality, a revelation of the structure of, and an operating manual for, Spaceship Reality. Religion, by contrast, has as its objective an active truth, one that will drive our subjective lives and our objective behaviors in quite specific directions, that will tell us what to say in this language, where to travel in the Spaceship.

On such a view, science and religion do not conflict because they have different objectives. The sphere of religion embraces ethics and morality, values and goals, ultimate truth and the meaning of life as we experience it, our inner lives as persons, as well as motivating relationships to what lies beyond our selves. The sphere of science embraces functional knowledge of an external object world in which, somewhat to our surprise, we find that our selves, too, have an object-like existence.

The problems raised by attempting in this way to resolve the overt conflict between science and religion are many. One is that such an approach would debar religion from making claims about the object world and what happened in it, unless such claims received the imprimatur of science. A second is that science does not seem describable without reference to human values implicit in its practice and implicated by the results of its practice. But these are quibbles by comparison with the objection that science and religion cannot be so reconciled because, on this view, religion could make no claim whatsoever that would not, insofar as it was offered as truth, be a candidate in principle for examination by science. Even truths about who we are and where our best interests lie, to the extent that they are not self-evident, virtually provoke a scientific inquiry into their truthfulness. They can be sustained as religious claims only by deliberately and dogmatically holding such inquiry in abeyance by denying science access to the truth of these claims. Conversely, as the Creationism-Evolutionism debate clearly demonstrates, precisely because we now hold that science is not merely a logical operation on self-given facts, precisely because we now hold science to involve interpretation in an elementary way, facts used by science are in principle amenable to re-interpretation, for example, on religion-based grounds. Science's preferred interpretations, the products of consensuses emerging out of communal enterprises, require for their support the (ultimately) dogmatic insulation of these interpretations from the enterprises of competing communities.

Only if we take a radical hermeneutic position to the effect that there is no text but only interpretation and none is privileged, can we accord equal status to all interpretations that work in some context regardless of their mutually exclusive character. But this flies in the face of one of the most characteristic features of science and of religion as practiced, namely, that both do display an unequivocal commitment to the existence of an ur-text of which each is a privileged explication, not merely an interpretation.

4. It is here, it seems to me, that we are driven to a recognition that the conflict between science and religion is deep and real because it derives from essential commitments embodied in their respective practices. I am moved to add that the conflict would, on this view, exist independently of the results of these practices. That is, if it were the case that at some point religious teachings and scientific theory agreed in content, they would nevertheless as practices conflict. Indeed, it seems to me that the conflict between science and religion is here revealed to be a subset of a wider conflict between philosophy and religion, and that the relationship between science and religion in our culture is only comprehensible in the context of a clear appreciation of the relationships, in our culture, between philosophy and religion, and between philosophy and science.

One way of seeing the mutual relevance of these relationships is by recognizing that the enterprises of science and philosophy overlap in essential ways. For example, the systematic study of nature was a branch of philosophy as a matter of fact from its first appearance in Christian-Western culture until the eighteenth century, and in name into the nineteenth century. Nor was this merely an artifact of contemporary university catalogues or the prevailing fashion for organizing knowledge. Medieval philosophy in the Christian West fought deliberate battles that consciously laid the foundations for the intellect-guided study of nature that would become modern science: winning legitimacy for a naturalistic value system, elaborating a naturalistic epistemology and within it an experimental method for bridging induction/empiricism and deduction/rationalism, initiating mathematical physics. At the same time, philosophy was emancipating itself from subordination to theology and establishing intellectual inquiry generically as an autonomous and authentic locus of truth. This is so central a theme of Medieval philosophy that even today "philosophy" is used as a synonym for independent intellectual inquiry, for critically determining for oneself what the fact of some matter is, and what its meaning is, at least for oneself.

The story of this emancipation was heralded by the controversy surrounding the work of the ninth century philosopher John Scotus Erigena, especially as applied to the problem of the transubstantiation of the communion wafer and wine into the flesh and blood of Jesus, a problem that raged through the ninth, tenth and eleventh centuries. Erigena created space for philosophy by simply proclaiming that what religion asserted to be true would be determined to be true in philosophy as well, and that what was determined to be true by philosophy would be discovered to be true for religion as well. There could, then, be no real conflict between the two, and so philosophy should be allowed to proceed even though its practice at moments appeared to conflict with current interpretations of religious truth. Through this practice, both religion and philosophy would benefit and Mankind's storehouse of truths would be greatly enriched. At the other end of the Middle Ages we have the (possibly mythical) doctrine of the double truth: the claim that philosophy was so distinctive an enterprise vis-à-vis religion that a proposition could well be true/false for it and at the same time be false/-true for religion. Therefore, philosophy should be left alone by the religious authorities because its conclusions were irrelevant to the truths proclaimed by religion.

Something fundamental happened in the course of moving from Erigena's standard to that of the Christian Averroists, such as Siger of Brabant, whose standard is supposed to have been that of the double truth, or even to the standard of the Occamists, whose conventionalism is strongly similar, in the end. What happened is epitomized in the career of Peter Abelard.

Abelard's signal accomplishment was the articulation of a naturalistic epistemology resting on a conviction that the human mind, unaided by any other agency (especially unaided by God) could arrive at a true knowledge of nature strictly as a result of the application of its innate capabilities to its empirical experience. Furthermore, Abelard's intellectualism (echoed loudly and accurately in the notion common to Galileo, Spinoza and Laplace that intensively our knowledge and God's knowledge are commonly knowledge) extended to the truths of religion and even to the mysteries of the Catholic faith, insofar as these were realities underlying nature and following, as nature did, in a necessary way, from the creator God.

At every step of his mature career Abelard was dogged by Bernard of Clairvaux who, Bertrand Russell notwithstanding, was a man of genius and intelligence. Bernard was a consummate Church politician as the aggressive leader of the Cistercian Order of reformed Dominicans and a conservative pietist in a time of great change in the relation between secular and spiritual values and institutions. The Cistercians were themselves in the vanguard of some of these changes as their monasteries, built to a standard plan and incorporating a wide range of the latest technologies in agriculture and water-powered machinery, spread through western Europe.

Bernard was a defender of the ultimate mystery of the person, of each and every human person let alone the "persons" of the Christian godhead. While his persecution of Abelard on specific points of religious dogma is readily comprehensible (however much we may regret his zeal), it seems to me that what Bernard found most threatening in Abelard's work was the notion that the scope of reason was unlimited. It was simply fundamentally wrong to claim that all truths were susceptible of rational demonstration, including such revealed truths as the createdness of the world and the trinital nature of God.

This objection is explicitly not based on a conflict between particular conclusions of philosophy and particular conclusions of theology. Even where philosophy arrived at the same end-point that theology taught, philosophy would have to be condemned, according to Bernard, precisely because of its tacit assertion of the superiority of the individual's arriving at the truth by him/herself, for him/herself, obviating, not to mention ignoring, revelation. For what did the Father's only-begotten Son take on flesh and suffer mortification if the truths so taught could be arrived at rationally? (Of course, Bernard was also convinced, not without reason, that in fact philosophizing would _not_ lead to the same truths taught by theology, as Abelard's writings clearly indicated. John Scotus Erigena's _dictum_ that philosophical and religious truth are isomorphic might be true in principle, but along the way to its realization there would be many errors and many souls would be misled by these and would suffer damnation.)

It reinforces my interpretation here to note that this contest between a rationalistic philosophy, orthodox in its religious intent, and a pietistic theology opposed to the philosophical enterprise itself, even if it were orthodox, was played out in Judaism and in Islam at just about the same time that it was played out in Christianity. Maimonides, the great Spanish-Jewish philosopher, offered a rationalistic interpretation of Judaism in the full confidence that it was beyond question orthodox. Furthermore, his _magnum opus_ was a rationalized reconstruction of the entire body of Jewish religious law that remains to this day a cornerstone of orthodox religious practice. Yet in his own lifetime and for a century afterward, Maimonides' work was criticized in the strongest terms by many leaders of Franco-German Jewry who opposed its intellectualistic, rather than voluntaristic, interpretation of Judaism. Maimonides' philosophical treatise, *Guide for the Perplexed*, in which this interpretation is articulated, has been as assiduously ignored by pietists for 700 years as his legal encyclopedia has been pursued.

Averroes, the great Spanish-Muslim philosopher, was a contemporary of Maimonides. Both grew up in Cordoba, both were Aristoteleans, naturalists and rationalists (believing that reason was the only means for resolving the problems humans encountered and was adequate to that task). Like Maimonides, Averroes created a systematic redaction of Islamic law. Like him, he offered a philosophical account of nature, man, truth and God that he supposed to be compatible with Islamic orthodoxy. To achieve this, he had to refute an important work by a slightly earlier Persian-Muslim writer, al-Ghazali, a brilliant philosopher who turned against philosophy as incompatible with Islamic piety and argued this at length in his important book *The Refutation of Philosophy*. As with Maimonides, and as with Abelard, Averroes was persecuted by pietists for his intellectualism, which was considered to be in principle in opposition to religious faith.

I am reminded in this regard of the dictum of Tertullian, the second century Christian apologist who, but for what was perceived to be an excess of piety, would almost certainly have become a Father of the Catholic Church: 'I believe because it is absurd' -- '*credo quia absurdum est*'. Tertullian's point is that it is precisely the irrational character of the truths revealed in the Gospel text that mandates *belief*. To attempt to demonstrate these truths rationally is expressive of a fundamental misconception of, or oppositon to, Christianity. And so Tertullian could proceed to claim that after the revelation of truth contained in the Gospel, there was no need for independent intellectual inquiry, even if it were possible to discover that truth in that way.

What seems to be at issue in this struggle between philosophy and religion that is so marked a feature of the Middle Ages is the willfulness of purusing an independent intellectual route to truth rather than the suspension of will that is a condition of accepting truth. There is the further willfulness of preferring such a route to the same truth that was available for acceptance in the religious tradition. And the still greater willfulness entailed by claiming that truths reached by independent intellectual inquiry were not merely personal but were universal, were truths with a capital "T", and so to be defended on the inevitable occasions when the conclusions of independent intellectual inquiry in fact conflicted with the conclusions of revealed truth.

In the Middle Ages, the systematic study of nature was intertwined with philosophy, whose struggle for independence sheltered the early development of the conceptual commitments that would flower as the seventeenth century scientific "revolution". These included commitments to the value of nature as an object of human inquiry and to the possibility of knowledge of nature, even though this entailed the epistemological and the ontological closedness of nature. That is, this entailed a commitment to the view that all natural phenomena could be understood solely in terms of other natural phenomena, so that Nature was self-contained: God was not active as an agent behind phenomena. Coordinate commitments were to convictions that overt phenomena were the result of covert motions of a material substratum possessing well-defined properties and that these motions could be discovered by an experimental method and described mathematically.

By the seventeenth century, philosophy had won its autonomy from religion, and the emergence of modern science was *symptomatic* of its unfettered activity. In the course of the eighteenth century, however, something peculiarly ironic began to happen. As science, still called natural philosophy, grew in explanatory power, as this "new philosophy" extended its scope to astronomy and physics and chemistry and biology and made its first forays into sociology, geology and psychology, it began to distinguish itself from philosophy. By the early nineteenth century this distinction became, as we have seen, pejorative for philosophy which was no longer the matrix of science (now with a name of its own), but another enterprise altogether. At its climactic development, modern, Newtonian, science had arrogated to itself a unique position *vi à-vis* truth: if a claim was not arrived at by a scientist, was not validated scientifically, then its claim to *truth* was spurious. This was as exclusionary for philosophy as for theology and so by a truly Hegelian turn, philosophy found itself relegated by its "child" to the same place that it had relegated theology, its "mother", namely, to history.

The response of philosophy to this supererogation of access to truth on the part of mechanistic science was a "court of inquiry" into the sub-discipline of the philosophy of science whose development over the past 150 years has gone hand in hand with the critique of science referred to earlier.

5. Recognizing that science shares with philosophy, out of which it was spun, the feature of resting on independent intellectual inquiry as its motivating commitment, and recognizing that at least the practice of science displays an embrace of science as a medium for obtaining knowledge about Being, requires recognizing too, that the conflict between science and religion runs very deep indeed. But their opposition, however fundamental, does not seem to me to be a cause for supposing that there is a problem here that needs to be solved by finding the common ground in which both can coexist, or with respect to which one or the other can be definitively refuted. The conflict between science and religion seems to me to be a fact about human experience; more than that, a fact about human being in the world. A corollary of this fact is that only a plurality of postures will do justice to human experience, a true plurality irreducible to some logically unifying ground from which the many can be derived. The only unity to human experience, on such a view, is co-existence within a single personality by way of the force of that personality. These different postures are mutually coherent through an act of will, not because they are rationally commensurable.

Does not such a conception as this of human existence require assent to a situation so bizarre as to be *prima facie* implausible? Given the near ubiquity of religious behavior throughout recorded history [while recognizing, of course, changes in what constitutes religious behavior], and given the frequency and extent of independent intellectual inquiry, is it plausible that two such pervasive behaviors should conflict in principle? Perhaps not, on the face of it, but such a situation is not at all unique. It is no more bizarre that science and religion are ultimately incommensurable yet equally authentic responses to experience, than that reason and will fundamentally conflict. Indeed, this latter conflict is if anything far more bizzare, for denial of the reality of either does positive violence to universal features of human experience. In spite of this, the reciprocal characters of reason and will as poles of experience *and* their irreducible conflict have been embraced virtually without demurral in the Western cultural tradition. In the Western *intellectual* tradition, the overwhelming preference has been to focus on reason as elementary and to see will as only a superficial feature of experience. Recognition of the elementarity of will has more commonly been a feature of religious tradition. It is already explicitly the condition of salvation is Isaiah and is that to which Habbakuk reduced the *Torah*: "The righteous shall survive by their faith". It is the move from Athens to Jerusalem for Paul, from philosophy to God, as reflected in Tertullian's *dictum* cited above. It was the basis of al-Ghazali's denunciation of philosophy and in particular of natural science, as infringing on God's unqualified will.

Multiplication of such illustrations from the great monotheistic traditions is a simple matter, but we must wait a long while before cognate claims pepper the Western intellectual tradition. Without attempting more than the briefest sketch here, one thinks of Turgot's analysis of social progress with its roles for chance, irrationality and violence, of Schopenhauer of course, of Nietzsche and Sorel and Bergson.

Indeed, it is rather the idea of a unitary, conflict-free, intellectually coherent, logically consistent representation of experience, or of the nature of things, that seems to me implausible. It is quixotic: a myth, in the sense of being a projection onto experience of a particular interpretation of experience, rather than a myth in the sense of a delusion. Such coherentist re-presentations of experience are what Nietzsche denounced as socratic in The Birth of Tragedy. They are what motivated Enlightenment rationalism, requiring that Goethe, who could not shake them off, save Faust, while Novalis, who could and did, could see heroic figures damned even if worthy of salvation. The invention of such re-presentations of experience and offering them as representations of reality stands, then, at the boundary of the Enlightenment and Romanticism. It is against just such inventions that so much of nineteenth and early twentieth century art, literature, music and philosophy was directed, seeing in them a juvenile wish that experienced conflict be resolved, that Job be healed and his wife, children and wealth restored, that the "irruption" of unreason be an error and be redressed, that death be an accident or a mistake and be undone.

The elementarity of the conflict between science and religion thus takes its place parallel to the elementarity of the conflict between reason and will, between Nietzsche's Apollinian and Dionysian responses to life. It finds an echo in current notions of left and right brain specialization, and of sexuality at hormonal, psychological and sociological levels of personhood. It is another instance of what the opposition and mutual penetration of yin and yang represented in Chinese metaphysics. It is another version of the coordinate authenticity of the Principle of Sufficient Reason that so dominates Western philosophy, and the largely ignored Principle of Insufficient Reason that so manifestly dominates every level of the sphere of human action: the principle that, effectively, we are never able to choose to act on the basis of logically sufficient reasons for acting just that way.

In all of these, we see the same sort of relationship of tension or conflict between responses to experience that are at one and the same time mutually implicating and in one or another sense mutually contradictory. Embracing the conflict between science and religion as elementary is expressive of an embrace of an important truth about human being. It is a truth that, as reflected in a long cultural history, most people want so much to avoid confronting that they go to great lengths to internalize myths that dissolve the contradictions within experience and mask this truth. Confronting it does remove from the inventory of our hopes the prospect of being both accomplished intellectually and at ease in Zion. Yet it does not, for that, compromise the authenticity either of the religious or of the intellectual responses to experience. What it does do is remind us that in this as in all other aspects of life, there is a price to be paid for holding on to all of life by attempting to cultivate "non-commuting" parameters of experience. If we knew as much about our selves as the philosophical anthropologies of the first half of the twentieth century promised to reveal, we would doubtless have been able by now to identify these parameters. We would then understand how obvious a matter it is that science and religion, if they are to be held together, must be held together, within a society and within a personality, at the pain of consciousness of an irresolvable conflict linking them. At that point, however, this conflict would no longer be pejorative. It would, rather, be appreciated as revealing a very deep generic feature of human existence.

Cultural Evolution and Religious Truth

Donald T. Campbell

While my lecture today is not long enough to merit such, I would like to begin with two invitations to two audiences.

1. An Ambivilant Invitation to Religious Believers

My lecture is based upon an acceptance of a blind-variation-natural-selection version of biological evolution, and an analogous process of social evolution. As such it has inevitable, if complex, relevance to questions of religious faith. If you regard the current grounding of religious faith as so seriously undermined that desperate remedies are justified, even if they risk the patient's life, this might be a message for you.

--For I will argue on evolutionary grounds that it is just as rational to follow religious traditions which one does not understand as it is rational to continue breathing air before one understands the role of oxygen in bodily metabolism.

--I will argue that if modern psychology and social science disagree with religious tradition on ways of living, one should, on rational and scientific grounds, choose the traditional recipes for life, for these are the better tested. (The social sciences are not able to experiment with the important issues they deal with and wrongly get credit for an authority comparable to that of the physical sciences.)

--I will argue as did Pascal, but on evolutionary grounds, that "The heart has its reasons which Reason does not understand"

and that it is rational to follow an evolved heart in such matters.

--I will argue that those priests who narrow the precious tradition which they transmit to that pittance which they themselves can understand and agree with are neglecting their duty and are guilty of hubris or pretensions of omniscience.

Such sentiments may sound comforting to those of us who want firmer grounding for what our religious intuitions tell us is true so desperately that we are willing to welcome support even from agnostic science. But such grounding is treacherous and undermining of the traditional sources of faith. It is only if these are already gone that we should risk the shift to this profoundly different world view.

A thesis such as mine can probably only be religiously constructive for those of us for whom the precious message is now hidden because it is presented in words we no longer believe, or in words we no longer understand. For such of us, however, radical experiments in translating must be tried.

2. A Tentative Statement of my Goals as a Missionary to Fellow Social Scientists

A. Achieving and disseminating scientific understanding of the restraining, inhibitory, counterhedonistic, and repressive content in religious, ethical, and moral teachings. Modern developments in the study of vertebrate evolution and human social evolution (the genetics of altruism, etc.) suggest that complex social interdependence among vertebrates requires cultural inhibitions of the selfish (for self and offspring) behavioral tendencies which genetic competition among the cooperators is continually selecting. Contrary to this, most psychologists and other social scientists regularly side with impulse and pleasure seeking, against traditional restraints, and mistakenly do so in the name of science. Because of the great prestige of science, deserved for some sciences but not in this area, this ubiquitous hedonistic advocacy greatly undermines traditional values.

B. Extending epistemic humility to the truths lying behind religious teachings. Popper, Polanyi, Quine, Toulmin, Kuhn, and Feyerabend have convinced us of the message of Hume and Kant: All knowing is presumptive, indirectly and incompletely corroborated at best. The language of science is inextricably figurative and metaphoric, never the language of the *Ding an Sich*. Sophisticated scientists may at times acknowledge this for their own field, but they tend to epistemic arrogance when contrasting scientific and religious truths. Since they no longer believe in what they suppose to be the literal referents of religious words, they lose sight of the possibility of great truths for which there is no literal language, which must be metaphorically or figuratively expressed if to be communicated at all. They hold up for religion the requirements of a direct realism, a literal veridicality, now recognized as impossible for science.

C. Translating religious truths into modern metaphors. In addition to the above, it seems to be desirable that sympathetic social scientists study those religious scriptures, parables, commandments, prayers, affirmations, sermons, etc. that are suspected of having a message worth preserving, and attempt to restate them in metaphors consistent with the scientific world image. Many will deal with human nature, and these should be relatively easy to translate. Others will present supraindividual social system truths, and for these we as yet have no generally accepted social science concepts. (Others will deal with truths our puny social sciences have as yet no glimmer of. And others will deal with physical and biological truths, etc.).

The sympathetic social scientist will have relatively less trouble with ethical truths dealing with human interaction. The greatest trouble will be in translating truths expressed in God language. In this regard, I have one particular suggestion, quite compatible with the use of linguistic analytic philosophy by modern theologians, and with books such as Gilkey's Naming the Whirlwind. This can be called "quasi-ostension." With modern epistemology, it recognizes ostensive definitions as equivocal and partial, but yet necessary. The suggestion is to use partial descriptions of God, stated in reverse, as quasi-ostensive definitions. Thus, "God is good," becomes "Good is God." Scientific atheists or agnostics can perhaps be convinced that they do not know Whom the God is Whom they reject, and have only learned the belief they negate through processes such as are being made explicit here. If they can affirm a belief in ideals of goodness, in terms of which all existing human beings and human institutions fall short and can be criticized, then even though they do not know the full details of the ideal, they can sincerely join in with many important religious prayers and affirmations by substituting the word "Good" for "God."

Similarly, "God is love" becomes "Love is God." So, too, for "God is the sum total of all of the causal forces in the universe," "God is truth," "God is the selective system that shaped man," etc. One can probably identify a dozen important quasi-ostensions which most atheists and agnostics sharing Tillich's ultimate concern could give assent to. Accepting each does not, of course, imply accepting the hypothesis that all have the same referent. Even without this, however, a considerable body of religious truths and religious experience might be saved.

Many God sentences have as a major import a warning against a human worshipping himself of herself as God. In this regard it is only fair to note that this program endangers the profound therapeutic value for gifted persons neurotically threatened by their own extreme narcissism that come from affirming a belief in the incredible (as exemplified in the lives of T.S. Eliot and Albert Schweitzer). However, for average educated persons, incredibility is now alienating them from the total message, and this is the larger problem. Moreover, incredible languages will no doubt remain available for those with intuitions gifted enough to recognize their therapeutic need.

D. Transcendence and social efficacy. My efforts at translation are a part of social-evolutionist efforts dating back at least to Herbert Spencer to provide a socially effective naturalistic code of ethics doing without supernatural transcendent authority. We need to regard it as an unproven conjecture needing study that the social efficacy can be achieved without the transcendent belief. Legal approaches to social control cannot be effective in the absence of support from internalized individual self-monitoring. But an effective super-ego or conscience may not be achieved by simply preaching scientific analyses proving that everyone would be better off if everyone abided by restraints and social duties. Even if convincingly conveyed, it would still leave it in the rational best interests of any single individual to be a "free rider" or to cheat on the system. Further analysis could conceivably convince us that awe-inspiring indoctrination was needed, to the degree at least as that which produced morally committed persons such as ourselves.

- - - - - - - - - - - - -

The version of culture evolution from which I speak builds upon the common formula for increasing adaptation that underlies trial-and-error learning and "random"-mutation-and-natural-selection biological evolution. I epitomize it as BVSR(R), Blind variation and selective retention (and replication). For me this is the only route to increased fit of system or entity to environment, the only route to increased order or orderly complexity of form. Furthermore, the selective process is required to maintain complex order and/or adaptation. Applied to an adaptive, wisdom-increasing cultural evolution, these ingredients must all be represented:

1. There must be heterogeneous variations in beliefs, practices, organizational structures. The variations may be "intelligent" or result from negligent failures to replicate the tradition. The process will work even if the variations are "blind," stupid, accidental, or "intelligently" chosen for what

turn out to be the wrong reasons. There is little doubt that the variation requirement has always been met.

2. There must be systematic selection processes persisting for extended time periods leading some variations to be more retained and replicated than others. If the process is to be considered adaptive, it must be so that variation-complexes associated with better functioning (in some sense or for some purpose) be more retained. The absence of systematic selection is a major reason for doubting that a progressive cultural evolution has taken place, and/or that current cultural content has an adaptive function. In the type of limited functionalism that I would allow sociological and anthropological theory, any positing of a manifest or latent function must be accompanied by the specification of a plausible selective system that would have selected for that function at that level of organization.

3. Other components which might be missing and might lead one to doubt the historical reverance of an adaptive cultural evolution are retention and replication. Tribal indoctrination, child training, conformity pressures, deference toward authorities, awed respect for tradition, are all plausible retention and replication processes, but they lack the rigid replicatory precision of meiotic and mitotic cell division, essential to biological evolution. Biological evolution has no doubt involved selection for the capacity for culture. Waddington's (1960) The Ethical Animal provides a marvelous discussion, including the positing of a pre-adolescent stage in which children are eager, credulous culture sponges. Not only can the variation be "blind"

and the process still work, the retention process must be "blind," loyally reproducing all the variations not yet winnowed out by the selection process. This is clearly so in biological evolution, where meiotic and mitotic cell division loyally duplicate useless and moderately harmful genes as well as useful ones. While "vicarious" selector theory can lead to editing processes that seem to obviate this (including gene "repair" processes and cultural mechanisms of textual correction), blind retention at some level is essential if cultural evolution is to produce traditions that are wiser than the priests who transmit them, as I firmly believe has taken place.

In making the case for a past adaptive cultural evolution, one should distinguish between two levels. Cultural evolution at the level of tools and skills has undoubtedly taken place. At this level, individual practice cross-validates the cultural wisdom, and individual trial-and-error problem solving contributes pre-selected variations to add to the cultural commulation. In contrast, the level I focus on is much more problematic. The cultural evolution of "wise," group-level functional organizational forms, customs, rules, laws, beliefs, ideologies, metaphysics, requires tribal (or other social unit) variation and selection.

Human beings, like all fertile animals, are in direct competition with their kin (except their identical twins) and neighbors for the food and shelter available in their environment. This ubiquitous condition creates an obvious interest in controlling how other individuals behave, best elaborated in David Wilson's (1980) interference theory. It can be analyzed as a conflict of interests between the group-as-a-whole and each individual as to how that individual should behave, thus getting into the problem of social control. However, I believe it is more appropriate to reserve that mode of analysis for the conflict of interests that emerges with social and ultrasocial forms of life. In a wide range of ecologies, co-operation such as found in big animal hunting and irrigated grain fields increases food resources and shelter from predators. But individuals are, once again, in competition for the size of their shares of these increased resources. At this level, however, a novel form of collective interest emerges: individual competition for maximum share of the resources jeopardizes the benefits of co-operation and the co-operative organization itself. Greedy quarrelling for maximum share reduces the pool of resources to be shared. In ecologies where co-operation multiplies by 10 or 100 times the per capita resources available, there is a payoff for effective social control that protects the efficacy of co-operation from individual greed. That such mechanisms are rare and fragile is the conclusion of analyses coming both from the mathematical models of evolutionary biology and the social sciences, as in the concepts of "the prisoner's dilemma," "the free-rider problem," and "the tragedy of the commons."

Ultrasociality refers to the most social of animal organizations, with full-time division of labor, specialists who gather no food but are fed by others, effective sharing of information about sources of food and danger, self-sacrificial effort in collective defense. A dozen or so archaic city-states and nations (each probably independently) achieved ultrasociality, with full-time priests, governors and soldiers who gathered no food, being fed by the workers, with granaries and large civic buildings and often with apartment-house concentrations. All were theocracies. All believed in supernatural gods and god-stories far more incredible (from a modern scientific point of view) than those of the simpler human societies that have remained for anthropologists to study -- and those are incredible enough. All had lavish and wasteful royal funeral and entombment practices. The economist and evolutionist must ask what inclusive fitness function led to the selection of this apparently lavish waste of human energy, tools and the sacrifice of useful domesticated animals and servants. These beliefs and action systems were obviously products of a cultural evolutionary process. They are so recurrent that I feel we are required to seek a function. I see that function in achieving social control by means of self-restraint that is effective (to some degree) even when human supervisors and policemen and worldly rewards and punishments are not present to shape individual behavior in the collectively optimal form. The beliefs about Valhallas that reward brave soldiers killed in battle, or the hells that punish cowards, thieves and liars, were legitimated and made more credible by the royal funeral waste testifying to the leaders' belief in an afterlife. The fit between the biases in human nature that follow from the fact of genetic competition among competitors and lists of religious sins and temptations explicit or implied in the commandments is also convincing. The emphasis on carnal, biological, human nature in the Christian tradition (at least) further fits. The genes say 'Thou shalt covet'; ultrasocial human culture says (or used to say) 'Thou shalt not covet'. While the detailed picture is more complex and confusing than this, I know of no better evolutionary explanation for religious moralizing and temple building or for the current energy investment in religion, even though other functions are no doubt also served. (Campbell, 1975, 1982, 1984.)

At this point the new model of social evolution of Boyd and Richerson (1982) becomes of particular value. It attributes a variation-generating function to the human capacity for belief conformity and to the human tendencies to force belief conformity upon fellow in-group members. They start with the mathematical models of biological evolution. A first modification is to permit multiple parents and cross-familial parenting in the transmission of beliefs, customs, skills, etc., to a younger generation. In the linear version of this model, in the absence of selection, the proportion of offspring carrying the trait is the same as the parent generation in the local communicating group. Selection imposed upon this model favors individual advantage under most circumstances and precludes the selection of beliefs, behavioral tendencies, and customs favoring group effectivenss at the expense of the individual carrying the belief. Such a belief transmission system would fail to select beliefs inhibiting the erosion of collective advantage by individual opportunism in the interests of individual inclusive fitness. Under such a model, the moral preachments to offspring would be of this nature: "Get others to cooperate, but be a free rider yourself." "Don't be a sucker." "Better a procreating coward than a dead hero." No doubt self-serving preachings such as these often go on in the privacy of homes, directly or indirectly, consciously or unconsciously. We can envisage on an individual selection basis a double standard of preaching, an altruistic morality for exhortation to others, a self-serving one for own offspring. I anticipate that in the long run such a system would not work to produce complex social coordination, even though it would end up with the altruistic preachings heard by the offspring generation being many times more numerous than the selfish ones.

In Boyd's and Richerson's nonlinear version of social transmission, the offspring are influenced to adopt the majority position of the parent generation. Under these conditions, groups move rapidly toward internal uniformity in the social transmission. With small groups, chance pluralities would occur in different directions from group to group, and thus the model predicts both internal homogeneity within groups and large group-to-group differences. This is the condition that permits group selection to be effective and, thus, the selection of beliefs and culturally induced behavioral tendencies that are beneficial to the group but costly to the individual. Such group selection at the cultural evolutionary level is, of course, a matter of the selective propagation of belief systems, as by the recruitment of new members to apparently successful groups or by the influence of group success on diffusion (i.e., the adoption by other groups of a successful group's beliefs and customs) or by the imposition of beliefs upon conquered peoples. (The biological extinction of whole groups, which is probably very rare, would only incidentally contribute to this process.) In addition, their model predicts the existence of dramatic group-to-group differences on socially transmitted traits that are neutral, thus obviating the need to explain every tribe-to-tribe difference in belief as an adaptation to a different ecology. (Campbell, 1983.)

It is hypothesized that the socially evolved moralizing in each complex society is focused on those behavioral tendencies for which the optimization of the social system and the optimization of own-gene prevalence are in conflict. It is probably so that on most options the behavioral dispositions that further inclusive genetic fitness also optimize social system effectiveness. These behavioral tendencies would not require social system preaching, as people would spontaneously adopt them on the basis of their innate tendencies. In Moses's day, as in ours, a scientific mediational normative ethic would have supported the commandment: "Look out for your own interests." But it was left off of Moses's short list of 10 commandments needing continual reiteration because, in those days, people were remembering to live by it without his prompting, unlike commandments such as "Thou shalt not covet."

If we were to (a) achieve a formal theory of social organization that would specify the individual behavioral tendencies that were optimal for maintaining the social complexity of the ancient urban societies of Egypt, Mexico, China, etc.; (b) apply the best of modern population genetics to describe the innate behavioral tendencies that biological evolution was probably producing in those settings; and (c) compare these two sets of predicted behavioral dispositions, we would then have in the differences a theoretical basis for predicting the content of the folk moralizings, moral law, proverbs, commandments, temptations, and sins for each of those ancient high civilizations. Insofar as similar ecologies and laws of social organization were involved, there would emerge predictions of common content to these moralizings. Even in advance of the formal development of these theories, it becomes of interest to compare the recorded moralizings of these ancient civilizations. While very little of this research has been done, sketchy, preliminary searches show that cowardice and selfishness are probably universally scolded and group loyalty universally commanded. Stinginess, greed, gluttony, envy, self-serving dishonesty, theft, lust, promiscuity, pride, and anger may also be universally proscribed. There are also puzzling universals and omissions. (Campbell, 1979.)

Just as we must reject normative biologism, in spite of our recognition of much moral wisdom in the genome, so too we must reject a normative sociologism which would posit an absolute normative dependence on social-evolutionary products such as the great religions. These too no doubt contain great wisdom where the relevant ecology has remained the same. But where the ecology has changed, what was once normatively moral may now be judged immoral, in terms of a scientific mediational normative ethic. The wisdom of any evolutionary process, biological or social, is wisdom about past worlds. (Campbell, 1979.)

These considerations lead me to suggest that evolutionary biologists, and others who are confused about the meaning of the name God, can worship their Creator by worshipping the selective system that produced man, man's ecological niche. Properly approached, this could succour many aspects of man's spiritual needs now being starved under the self-worship that too often comes with loss of traditional values, and without compromising scientific scruples:

-- The attitude of awe of superior unknown powers; for certainly we do not yet know much about the selective system that shaped civilised social man. (If even the niche of the termites can contain such wonders as laws of sociology, what greater wonders may not our selective system contain, eternal truths unsuspected as yet by our puny social sciences.)

-- The recognition that man was shaped by purposes beyond the petty concerns of individual man.

-- Recognition of a Creator that is what It is for Its own purposes, and is free to change Its purposes without regard to the previous covenants we may have felt were made in the past and with which our lusts and loyalties may be more compatible.

-- A prayer and spiritual wish that we may live lives loyal to those purposes in such a way as to optimise man's survival over eternity, not just for our lifetime.

-- A recognition of an incomplete adaptation and an Omega Point whose outlines we can only dimly surmise, an alternative to self-inflicted extinction. (Campbell, 1974.)

I will end with a scripture reading from St. Paul to the Corinthians (13:12), (a revised translation): "For now we see as through a clouded glass, and it would be heaven if we could know directly."

Appendix

I agree with Steven Goldman and Norman Melchert that religion and science are in conflict, and, at the world-view level, will continue to be so. But on one aspect of that conflict, on the "moral order" or on recipes for living, where the social sciences (including psychology, psychiatry and sociobiology) are in conflict with religion, I believe it is unfair to credit the social sciences with the status of science. They do not deserve the prestige of that status. On the issue in which they conflict with religion, the social sciences are merely wise speculation, not well-tested science. Goldman may have seemed to recommend resolving the conflict by intellectual compartmentalization. With this solution, I concur, even though I do not practice it myself: be a scientist in the lab, and be religious at home. For even within our sciences, we all give assent to incompatible beliefs.

In one of his essays, C. S. Lewis posed a basic choice in world views, which I will translate as a basic choice in origin myths:

> First: (Theistic or Deistic) "In the beginning there was Mind, Intelligent Purpose, Consciousness."
>
> Second: (the psysicalist, naturalistic) "In the beginning was the inorganic world, and from it the organic evolved without contradiction of inorganic laws. This evolution was by unforesighted processes encountering unforeseen possibilities. Later there emerged locomotor life, still later conscious experience and animal purpose, at all levels evolved by nonforeseeing, non-purposive processes."

I have made the second choice. But I agree with John Speller that it is not necessary for scientists to make the same choice, and that, on the contrary, many great scientists (past and current) have chosen Supernatural Mind and Purpose, and have developed great unifying physical theories in the service of that choice. The relativization of scientific truth in recent philosophy of science has made that choice easier. My own list of great scientists and students of science choosing C. S. Lewis's side of the great divide includes Michael Polanyi, John Eccles, Donald MacKay, Mary Hesse, Stanley Jaki (with his argument from Singularity), and Freeman Dyson (with his chapter on "The Argument from Design," in his Disturbing the Universe). My lecture is really not addressed to theists or deists, but rather to my fellow agnostic social scientists.

References

Boyd, R. & Richerson, P. J. Cultural transmission and the evolution of cooperative behavior. Human Ecology, 1982, 10, 325-351.

Campbell, Donald T. "Downward causation" in hierarchically organized biological systems. In F. J. Ayala & T. Dobzhansky, (Eds.), Studies in the philosophy of biology. London: Macmillan, 1974, 179-186.

Campbell, Donald T. On the conflicts between biological and social evolution and between psychology and moral tradition. American Psychologist, 1975a, 30, 1103-1126 (Dec.). (Twenty-one critiques plus a "Reprise" American Psychologist, 31, 341-384 [May].) (Reprinted, with ten additional critiques in Zygon: Journal of Religion & Science, 1976, 11, Sept., No. 3.)

Campbell, Donald T. The conflict between social and biological evolution and the concept of original sin. Zygon: Journal of Religion & Science, 1975b, 10, 234-249.

Campbell, Donald T. Response to Dyer. American Psychologist, 1978, 33, 770-772 (August).

Campbell, Donald T. Comments on the sociobiology of ethics and moralizing. Behavioral Science, 1979, 24, 37-45.

Campbell, Donald T. Legal and primary group social controls. Journal of Social and Biological Structures. (Special issue on Law, Biology and Culture; Issue editors, Margaret Gruter and Paul Bohannan), 1982, 5, 431-438 (No. 4 Oct.).

Campbell, Donald T. Two distinct routes beyond kin selection to ultrasociality: Implications for the humanities and social sciences. In Diane L. Bridgeman, (Ed.) The nature of prosocial development: Theories and strategies. New York: Academic Press, 1983.

Waddington, C. H. The ethical animal. London: Allen & Unwin, 1960.

William Prout (1785-1850) and His Hypothesis: The Religious Dimension in Grand Unified Theories

John L. Speller

William Prout is well-known to historians of science as the originator of "Prout's Hypothesis" -- an important catalyst in the development of atomic theory between its publication in 1815-16 and the work of Rutherford and others a century later. Briefly stated, Prout's Hypothesis postulated that all the more complex elements are composed of aggregations of hydrogen atoms. This is now believed to contain some truth in so far as it is now known that one of the chief constituents of the atom is the proton or hydrogen nucleus, and that the atomic number or number of protons in the nucleus gives each atom its distinctive chemical properties. At the time, however, when Prout's Hypothesis was first published at the beginning of the nineteenth century, the scientific evidence seemed rather curiously against it, and it was enthusiastically maintained by Prout and others only in the face of apparently adverse facts.

In view of the influence which Prout's hypothesis exerted on the scientific community during the nineteenth century, surprisingly little has been written about his life and work.[1] William Prout was born on 15 January 1785, eldest son of John Prout, a gentleman farmer in Gloucestershire, England. He was trained in medicine at Edinburgh University Medical School, where he graduated in 1811. After further medical training at St. Thomas's and Guy's Hospitals in London, he set up in London the most successful medical practice of his day specialising in urinary diseases, on which he was the leading authority in the first half of the nineteenth century. His most important discovery in the field of medicine was his realisation that hydrochloric acid is present as a digestive juice in the stomach; he was also one of the first systematic writers on nutrition, and to him we owe the classification of foodstuffs into water, carbohydrates, fats and proteins. So successful was Prout's medical practice that when he inherited his father's farming interests he was able to give them away to his younger brother. He was also an accomplished performer and composer of organ music. He suffered greatly from deafness in his declining years, a fact which led to his withdrawing somewhat from the English scientific community. He died in London on 9 April 1850, aged sixty-five.[2]

Prout first came to the attention of chemists through an anonymous article entitled "On the relation between the Specific Gravities of Bodies in their Gaseous State and the Weights of their Atoms", published in the Annals of Philosophy, edited by Thomas Thomson, in 1815. In this paper he claimed to be able to show, from the most accurate evidence then available, that the atomic weights of all the elements are exact multiples of the atomic weight of the lightest element, hydrogen. Most elements fitted this scheme quite well, but chlorine, with an atomic weight of 35.5 seemed anomalous, even at the time Prout was writing.[3] Prout followed up his original 1815 article with a second in 1816, reasserting his view that the atomic weights of all the elements were exact multiples of the atomic weight of hydrogen, and adding, significantly, "If the views we have ventured to advance be correct, we may almost consider the prote hule [that is, the primal matter] of the ancients to be realised in hydrogen."[4] Here, then, is the first statement of Prout's Hypothesis: the atoms of heavier elements are made up of aggregations of atoms of the lightest element, hydrogen.

Prout's hypothesis was received with enthusiasm by most English chemists; although John Dalton, the leading advocate of the atomic theory in the early nineteenth century, was a notable dissenter. Thomas Thomson, editor of Annals of Philosophy where Prout's papers had been published, became his main champion. Continental chemists were on the whole sceptical of Prout's Hypothesis, and the opposition was led by the leading chemist of the day, Berzelius. The desire to show conclusively whether Prout or Berzelius was correct led to important advances in the methods of determining atomic weights. For a while things seemed to go well for Prout as, for example, when in 1841 Dumas and Stas produced a figure of exactly 12 for the atomic weight of carbon. Chlorine continued to be a problem at 35.5, but in 1842 the French chemist Marignac, an ardent believer in Prout's Hypothesis, suggested that the problem might be solved by making half a hydrogen atom the standard unit. What seemed at the time the final blow to Prout's Hypothesis, however, came in 1860, when Jean Servais Stas, who had been an active supporter of Prout's Hypothesis, came to the reluctant conclusion that it was untenable. He made a large number of impressively accurate determinations of atomic weights, and was able to prove conclusively that atomic weights were not integral multiples of that of hydrogen. He commented, "I had to admit that I was beaten and had spent the most important part of my life in killing my first love".[5] Even then not everyone abandoned Prout's Hypothesis: his great supporter Marignac even went so far as to abandon the law of conservation of mass and anticipate the packing effect in the nucleus of atoms in his attempts to explain away Stas's results. But to all intents and purposes with the publication of Stas's results in 1860, all the scientific evidence seemed to be against Prout's Hypothesis, and it was put on to a shelf and left there to gather dust for the next forty years. I stress the word seemed because in fact -- as Imre Lakatos has demonstrated -- failures to grasp the truth of a correct scientific model invariably result from overlooking an additional hypothesis, so unlikely that it apparently does not even merit discussion: in this case the hypothesis that the atomic weights of all atoms of the same element are not necessarily the same.[6] Contrary to what Kendall says, it would appear that Prout's Hypothesis was not an entirely dead issue even in the 1880s, and it is interesting that William Crookes in 1886 described Prout's Hypothesis as "an expression of the truth, masked by some residual or collateral phenomena which we have not yet succeeded in eliminating".[7]

But suddenly the tide of evidence appeared to turn, and to flow once more in favor of Prout's Hypothesis, so that at the beginning of the twentieth century the evidence in support of the unity of matter was becoming very strong. This trend culminated in 1911 with Rutherford's formulation of the theory of the nuclear atom. Rutherford postulated that the hydrogen atom consists of a central positively charged nucleus or proton, with a much smaller negatively charged particle or electron in orbit around it. The atoms of other elements have steadily increasing numbers of protons and electrons, together with a varying number of "collapsed hydrogen atoms" or proton-electron pairs or (as we now know them) "neutrons".[8] Prout was thus proved right by Rutherford, at least to the extent that it is the atomic number or number of hydrogen nuclei or protons which determines the nature of every other element.[9]

All this is well-known to historians of science. The next part of my paper is not. As well as being the formulator of Prout's Hypothesis, William Prout was the author of one of the Bridgewater Treatises on "The Power, Wisdom and Goodness of God as manifested in the Creation".[10] Prout was responsible for the eighth Bridgewater Treatise, entitled Chemistry, Meteorology and the Function of Digestion considered with reference to Natural Theology.[11] In this book Prout sets out his version of the teleological argument or argument from design, which seeks to prove the existence of a loving creator by demonstrating that nature fits together in such a perfect way that it cannot have arisen by chance and must be the work of an intelligent designer -- God.[12]

From the theological point of view Prout's book can at best be described as mediocre, but there is something rather special about it which nobody seems to have noticed before. It is filled with a large number of prophecies about the future course of science, almost all of which have subsequently been fulfilled.

An example of this is his discussion of the nature of the forces responsible for binding atoms and molecules together in crystals in patterns like, for example, a cubic lattice such as one finds in sodium chloride. He correctly concludes that the molecules making up such a lattice must possess polarity similar to that possessed by a magnet.[13] He goes on to discuss the magnetic attraction which exists between wires carrying electric currents, and argues that polarity is a fundamental property of both electricity and magnetism, and that electricity and magnetism must be different forms of the same energy. By analogy, therefore, it seems to him plausible that the forces binding atoms and molecules together into chemical compounds are also likely to be some form of the same energy as electricity and magnetism:

> We have shown, that the electric and magnetic polarities, or energies are actually related to one another, precisely in the same way, that we supposed the chemical and cohesive polarities to be. The question then at once arises, -- are the forces identical? . . .To us, we have no hesitation in saying, this conclusion seems very probable, nay, almost inevitable.[14]

Here Prout is being the true scientific prophet: he correctly conjectures -- four or five years before the work of Faraday was anything like complete -- that electricity and magnetism are "different forms of the same energies"; and he suggests that electricity is ultimately responsible for the chemical behavior of matter, a view which was subsequently vindicated in the later history of science. Prout also correctly conjectures that gravitation is a more fundamental force, unrelated to electromagnetic interactions.[15]

In a subsequent section of his book, Prout goes on to consider the nature of heat and light, and it becomes clear that he is attempting to unify all knowledge, and to build every known form of physical interaction into a grand unified scheme. He concludes that heat and light are also energies possessing polarity, and that they too are related to electricity in some way. So far as heat is concerned he is on somewhat unsound ground (though, in fairness, the particular phenomena he considers are examples of infrared energy). His discussion of light, however, shows amazing foresight, and points forward to Maxwell's work in the field of electromagnetic radiation:

> Heat, and we may add light, are substances, the molecules of which are influenced by polarizing forces, precisely similar in all respects to those which influence common matter; that is to say, that the molecules of heat and light obey laws, similar to molecules of ponderable bodies . . . Whatever heat may consist of besides, it is almost impossible to explain its effects upon the polarising forces, without supposing that it at least involves, if it does not pass into, the electric forces, upon which the polarising forces *appear* to us to depend.[16]

Prout's reference to "molecules of light" at a time when Huyghen's wave theory of light was almost universally held is fascinating. Prout adds a footnote in which he amplifies what he means by this, saying that while he is aware that an undulatory theory of light is the best model for many mathematical calculations, the *chemical* properties of light can only satisfactorily be explained in terms of a corpuscular theory:

> We are aware that this opinion is opposed to that of most mathematicians, who favour the undulatory theory of light; and with good reason, so far as

> they have occasion to consider it: but we are decidedly of opinion, that the *chemical* action of light can be explained only upon chemical principles.[17]

Here, then, in 1834, we have the seeds of the quantum theory of light and of the wave-particle duality as well as Maxwell's ideas on the unity of electro-magnetic phenomena. We have only to call Prout's "molecules of light" *photons* in order to see how close he comes to modern thinking on the subject.

In a few cases Prout's prophecies are not fulfilled, but even there, however lunatic the ideas he comes up with, it is instructive to study his methodology, which is entirely consistent throughout. Thus, for example, Prout attempts to relate electricity, magnetism and heat in order to account for the earth's magnetic field, and postulates a series of thermo-electric currents circulating beneath the earth's crust.[18] Nevertheless, Prout is here applying precisely the same type of analogical argument that he has used when writing his papers on the unity of matter or in suggesting that electricity, magnetism and light are different aspects of the same phenomenon.

At one point only in the book does Prout's nerve fail him. This is on the question of the fixity of biological species. It would be consistent for Prout to deduce from the analogical arguments which he applies everywhere else that one species can evolve into another, but -- probably more out of conservative religious motives than from scientific conviction -- he concludes:

> We consider it . . . impossible that by any accidental concurrence of circumstances, a dog can, in the progress of time, be gradually converted into an ape, or an ape into man; and moreover, we

> not only think such an hypothesis directly at variance with the whole tenor of the laws of nature, but quite absurd.[19]

Even in the very process of rejecting the evolutionary process, Prout manages nevertheless to produce a tolerable summary of modern biochemical ideas about enzyme action:

> We have not, in artificial chemistry, any control over individual molecules; but are obliged to direct our operations on a mass, formed of a large collection of molecules. The organic agent, on the contrary, having an apparatus of extreme minuteness, is enabled to operate on each individual molecular separately; and thus, according to the object designed, to exclude some molecules, and to bring others into contact... . Hence the organic agent, in its simplest state, may be viewed as a power so controlling certain inorganic matters, as to form them into an apparatus, by which it ranges and organizes other matters, and thus effects its ulterior purpose.[20]

These examples should give some idea of the way in which Prout, in his efforts to unify and synthesize scientific knowledge, produces what may be characterized as "scientific prophecies".

Why is Prout interested in grand unified theories? Why does he include all these scientific conjectures in a treatise on theology? Why were other scientists like Stas, Marignac and Crookes so intent on proving that Prout's Hypothesis of the unity of matter was true -- to the extent that Stas was heartbroken when he thought he had disproved it, and Marignac was so attached to the theory that he was prepared to abandon the law of conservation of mass rather than abandon Prout's Hypothesis?

The answer to all these questions is, I believe, like Prout's Bridgewater Treatise, theological. It is intimately tied up with the nature of the teleological argument or argument from design. The important thing about the design argument is that everything in the world -- the organs of animals and plants, the suitability of the earth's climate for sustaining life, and so on -- possesses congruity and adaptation: everything has to fit together into a grand scheme, the existence of which is believed by the teleologists to point to the existence of an intelligent designer -- God. The interesting feature of Prout's arguments is that whereas most teleologists like Paley start with the known scientific data and theories and then discuss how, for example, the fact of a squirrel's tail being adapted for climbing indicates the care and concern of a loving creator, Prout starts at the opposite end. Prout's argument is this: *suppose* there is a loving creator, then it follows from this that the teleological argument will hold true and there will be congruity, adaptation, and indeed a perfect fitting together of *all* the phenomena in the universe. So *assuming* the existence of such a creator, it *must* be the case that there is some link between all the various scientific phenomena such as chemical behavior, light, electricity, magnetism, heat, and so on. Hence Prout's concern with grand unified theories, and hence his startling predictions of scientific progress.

At some points in his Bridgewater Treatise Prout actually comes close to articulating the concern I have outlined above. Thus, for example, at the end of his discussion of chemical reactions, he comments:

> The above [examples] are designed to illustrate the principles of the argument only: the argument itself, like all the preceding, is strictly cumulative; and applies, more or less, to every operation of nature. Such is a summary sketch of the wonders developed by chemistry; and what an

> idea do they convey to us of the wisdom, and of the power of Him, who contrived and made the whole! Of the *capacity* of that eternal Mind; who, while He directs the universe; at the same time takes cognizance, and regulates the movements, of every individual atom in it! To whom, the inmost nature, and end, and object, of every part are familiar; of whose comprehensive designs, the whole forms but a single link; the antecedent, and the consequent to which, are merged alike, in infinity![21]

Notice the teleological language Prout uses here. He is especially interested in God as the one "who contrived and made the *whole*"; he refers to God's *comprehensive* designs"; of things being "*merged* . . . in *infinity*". The sort of evidence he says he is looking for is evidence of congruity, of things fitting together in a comprehensive whole, and this is precisely the kind of evidence which he lays out in his Bridgewater Treatise and -- more to the point -- when he cannot find enough of such evidence he "invents" or rather "prophesies" it. *A propos* of his scheme to unify electric and magnetic phenomena, he says:

> Recent and beautiful discoveries show, in the most striking manner, that the operations of nature are more extraordinary, and indicate more of simplicity and wisdom of design, in proportion as they are better understood. By what simple expedients, when known, are those wonderful phenomena of the earth's electricity and magnetism produced, which formerly appeared so anomalous and perplexing! And what encouragement do these discoveries hold out to us, respecting future discoveries, which may throw still further light upon the operations of the Great Architect of the universe.[22]

Notice that *simplicity* is also one of Prout's marks of design, an idea common among teleologists of his generation.

The implication of this discussion is that there is some relation between teleology and the scientific quest for unity in the laws of nature. The question of simplicity is particularly interesting. Occam's Razor states that entities ought not to be multiplied, and this amounts in a sense to saying that simplicity is to be looked for in the most satisfactory scientific laws. Now it is probable that William of Occam himself, a firm opponent of science, meant something quite different from this;[23] and there is widespread disagreement over the extent to which Occam's Razor should be accepted as a canon of scientific thinking in any case. But nevertheless it is an interesting fact that some of those interested in grand unified schemes in science have been among those who adopt Occam's Razor as a canon of science. The discussion of Prout's teleological interests may lead us to ask how far Occam's Razor is a theological, how far a philosophical and how far a scientific principle; and how far it is possible to separate these three aspects at all.

The argument may also help to shed some light on the reasons why modern science seems to have arisen within Islam and then in the Judaeo-Christian west. Was it inevitable that science should have arisen in a theistic environment because of theistic concerns with teleology? Teleology can be seen, for example, in the concerns of Thomas Aquinas and in the grand medieval synthesis of all knowledge into a single circle of disciplines with theology as the "queen of sciences", however unsatisfactory and inadequate this synthesis may have proved to be. Do not misunderstand me here: I am not saying that science was caused by theism, or even that theism was the seed out of which science grew. Other factors, such as astrology and alchemy, may have been equally if not more important. But what I am saying is that theism -- and in particular the teleological concerns of medieval theism -- may have been the soil, the fertile medium in which the seed of science, wherever it came from, was enabled to grow. It may be significant here that the historian Joseph Needham has argued that science did not achieve the success it might have in ancient China largely because of the lack of belief in a rational Creator, and therefore in a rational universe.[24]

What I certainly do not wish to suggest is that it is impossible to be a good theoretical physicist without being a good theist. Some scholars have indeed argued that unified schemes in science have to be based on the religious teleological argument -- Stanley Jaki's "argument from singularity" being the most notable example of such reasoning in recent years.[25] There are, however, moral dangers in arguing for too close a connection between a Creator and the operations of the universe -- it becomes too easy to suggest that all that happens is right. I am not even convinced that a rationally comprehensible and ordered universe is necessarily more compatible with theism than a disordered one in which rational thought, among other things, might be impossible. The inability of the unaided human reason to arrive at an adequate understanding of the universe would be a strong argument in favor of the necessity of a historical revelation, something which has been important in traditional theism. The implication of the teleological argument, on the other hand, is the sufficiency of human reason, and this may cause problems for traditional religious ideas about divine revelation. There seems, therefore, no reason why either an ordered universe or a disordered one might not be compatible with theism, and thus that as a religious argument the teleological argument is far from adequate.

But it may prove possible to argue that in order to be a good theoretical physicist one has to be a believer in some kind of teleology -- scientific rather than religious teleology let us call it -- at least to the extent of believing that the assumption that the universe is ultimately comprehensible is a useful scientific model in certain areas of theoretical physics. Despite the opposition of scientific positivists like Neils Bohr to this idea, Jaki, for example, shows how many of the leading synthesizers of knowledge into grand schemes have been believers in the fundamental unity and susceptibility to rational exploration of the universe. Jaki quotes Boyle as a notable example in the seventeenth century, and Planck and Einstein as notable examples in the twentieth.[26] This is not necessarily a religious assumption, though it seems clear to me that historically in certain instances -- of which Prout is probably the example par excellence -- it is strongly associated with religious beliefs.

Grand unified theories are, of course, a concern of some theoretical physicists today. Just as Maxwell (himself a highly religious man) combined light, electricity and magnetism into a unified theory electro-magnetic field theory, so as one looks back in time, as it were, to the beginning of the universe, the forces seem gradually to merge back together into a single force. The experimental data for this come largely from the giant particle accelerators which operate by accelerating sub-atomic particles to ever higher energies and studying their interactions. Gravitation is still poorly understood -- as Prout perceptively noted -- and in any case it seems unlikely that particle accelerators powerful enough to go right back to what is sometimes significantly called the single "monotheistic" force can ever be constructed -- so a grand unified scheme which takes account of all the interactions in the universe is still a long way off. Nevertheless more limited unified schemes have still been useful. One of the most famous of these to be produced in recent years is the Weinberg-Salam theory, named after its formulators Steven Weinberg and Abdus Salam, which combines electro-magnetic and weak nuclear forces into a single "electroweak" interaction. It is interesting how discussions of this type of research often verge on the religious. For example, in a recent article Timothy Ferris says: "A unified physics would promote a scientific vision of nature worthy of Zen masters and the Old Testament prophets -- a vision revealing that everything about us belongs to a chain of cosmic evolution that leads us back to the birth of the universe and forward to a glimpse of the fate of the universe."[27] Though (as I have argued) there is no inherent reason why this should be the case, even today scientific and religious ideas are not always kept as much apart as one might expect! Furthermore, teleology would still seem to be of use in certain areas of theoretical physics (at least as a scientific model), where in some ways perhaps it seems to function rather like one of Kant's "regulative ideas". Thus a study of Prout's Bridgewater Treatise may prove to be illuminating for religion, philosophy and science alike.

Notes

1. The only full-length study of Prout is contained in W. H. Brock's Ph.D. thesis, "The Chemical Career of William Prout", University of Leicester (England), 1966. Brock is also the author of the entry on Prout in the Dictionary of Scientific Biography, which gives a bibliography listing ten articles on Prout, five of which are by Brock. Rather curiously, however, Brock does not cite what is perhaps the best historical study of Prout's Hypothesis, James Kendall's article, "The Adventures of an Hypothesis", Proceedings of the Royal Society of Edinburgh, Section A, Volume 63, Part 1, Number 1 (1949), pp. 1-17. I shall be drawing upon Kendall for some of the historical material in the present paper.

2. Dictionary of Scientific Biography, ed. C. C. Gillispie (New York: Charles Scribner's Sons, 1975)), Volume 11, pp. 172-4.

3. At the time the formula of water was believed to be HO rather than H_2O, and this means that most of the atomic weights at the time Prout was writing were taken to be approximately half the currently accepted value: hydrogen 1, carbon 6, nitrogen 7 and oxygen 8 seemed to fit Prout's scheme quite well, but many other elements did not, and Prout was forced to argue that their atomic weights had been inaccurately determined, a view which became increasingly untenable as time went on. Thus from the start Prout had to "fudge" the evidence to make it fit his theory.

4. Quoted by Kendall, p. 2.

5. Quoted by Kendall, p. 5.

6. See Imre Lakatos, "Falsification and the Methodology of Scientific Research Programmes" in *Criticism and the Growth of Knowledge: Proceedings of the International Colloquium in the Philosophy of Science, London, 1965, ed.* Imre Lakatos and Alan Musgrave (Cambridge: Cambridge University Press, 1970), Volume 4, pp. 128-40. I am grateful to Professor Don Campbell for bringing this article to my attention.

7. Quoted by Lakatos, p. 139.

8. Modern theories differ slightly in their view of the nature of the neutron, and Rutherford's ideas have been modified further to take account of the wave-particle duality, quantum physics and the Heisenberg Uncertainty Principle, but nevertheless Rutherford's theory largely represents the currently accepted view.

9. There are two reasons why atomic weights are not integral. The first is because of the existence of isotopes (thus, chlorine has an atomic weight of 35.5 because some chlorine atoms have 17 protons and 18 neutrons, while others have 17 protons and 19 neutrons; the ^{35}Cl and ^{37}Cl atoms are mixed in proportions of approximately 3:1, giving an average atomic weight of 35.5). The second factor, though quantitatively much less significant, is that, amazingly, Marignac was right in abandoning the law of conservation of mass: there does indeed exist a packing effect in the nucleus of atoms.

10. The eighth Earl of Bridgewater (1756-1829), one of the richest and most dissolute members of the English aristocracy in the early nineteenth century, performed two very altruistic acts. The first was to donate a very large sum of money to the nation

in order to purchase the important Orleans Collection of paintings. The second was to leave the sum of eight thousand pounds in his will to the President of the Royal Society to be used to commission eight treatises to demonstrate "The Power, Wisdom and Goodness of God as manifested in the Creation". There are in fact nine Bridgewater Treatises, since Charles Babbage, inventor of the calculating engine which was a precursor of the modern computer, annoyed at not being asked to write one of the eight treatises, wrote one anyway. William Prout, who as well as being a religious man had become a Fellow of the Royal Society in 1819 and winner of the Society's Copley Medal in 1827, was an obvious candidate to be commissioned by the President of the Royal Society to write a Bridgewater Treatise.

11. William Prout, _Chemistry, Meteorology and the Function of Digestion considered with reference to Natural Theology_ (London: William Pickering, 1834).

12. The argument, which goes back to Plato's _Timaeus_, was popularised in the late seventeenth and early eighteenth centuries by John Ray and William Derham. It was given its classic expression by William Paley in his book _Natural Theology_, published in 1802. So highly thought of was Paley's book that in the 1820s John Duncan, curator of the Ashmolean Museum in Oxford and himself author of a book about the teleological argument called _Botanico-Theology_, reorganized Oxford University's entire natural history collection simply to illustrate the argument of Paley's book -- a rather odd reason for having a science museum! In his Bridgewater Treatise, Prout provides illustrations of

Paley's argument using his expertise in the fields of chemistry and medicine. (Why he also writes about meteorology is a mystery to me.)

13. Prout, pp. 40-42.

14. Prout, pp. 52f.

15. Prout, pp. 56f.

16. Prout, p. 59.

17. Prout, footnote, p. 59.

18. Prout, pp. 242f.

19. Prout, p. 441.

20. Prout, p. 439.

21. Prout, p. 187.

22. Prout, p. 243.

23. See, for example, Stanley L. Jaki, The Road of Science and the Ways to God. Gifford Lectures for 1974-75 and 1975-76 (Chicago: University of Chicago Press, 1978), pp. 41f.

24. Jaki, p. 14.

25. See especially Jaki, p. 279.

26. Jaki, pp. 82, 166-87.

27. Timothy Ferris, "Beyond Newton and Einstein: On the Frontiers of Physics", New York Times Magazine, 26 September 1982, p. 38.

Jewish Responses to Technology and Science

Daniel J. Lasker

The relationship between Judaism and technology is not a new one. The earliest records of a confrontation between the two go back to the story of the conquest of Canaan in the times of Joshua. The Israelites, after having spent forty years in the desert, approached the promised land with a distinct technological disadvantage: the Canaanites had iron chariots while the Israelites had only an infantry. The Israelite solution was to keep to the hill country, thereby neutralizing the advantage of the enemy. The first technological challenge to Judaism was not met head on; it was simply circumvented.

In today's world, any discussion of technology and Judaism obviously goes beyond the military dimension. Still, one cannot ignore completely that aspect of the relationship. One of the main purposes of scientific and technological research conducted in Israel today is for security applications. For better or for worse, the Uzi sub-machine gun, the Kefir fighter plane and the Merkavah tank have taken their places as symbols of progress in the reconstituted Jewish state as much as, if not more so than, advanced technologies in agriculture and electronics. One must also remember that in the twentieth century the Jewish people has seen how modern technology, added to age-old anti-semitism, almost resulted in the total destruction of Jewish life and religion. Earlier attempts at genocide had failed partially because the perpetrators lacked the means of carrying out their plans. The Jewish experience in the twentieth century illustrates that technology in the hands of those with no moral scruples is a recipe for disaster.

In a sense, this is the challenge of technology to Judaism today: how to employ technology wisely and in accordance with Jewish tradition; how to use the benefits of advancing science without abusing them; how to utilize the progress of the present without overturning the values of the past. A survey of Jewish uses of, and reactions to, technology and science will show the tensions involved and the different ways in which the challenges have been met.

For the traditional Jew, subordinating the advances of technology to the demands of religion requires that one use the halakhah, Jewish law, as the determinant of that which is permissible. It is true that at present the majority of Jews do not see halakhah as binding, and, therefore, it could be argued that there are different Jewish approaches to the questions dealt with here. While that is very true, it would seem to be that only those responses which are based on halakhah would be uniquely Jewish. Someone who talks about the "spirit of Judaism" or the "values of Judaism," outside of a halakhic context, is likely merely to be talking about a system of morality or ethics which is more closely connected to other present day value systems than to the Jewish religion.[1] This does not mean that one branch of Judaism has a monopoly on either truth or loyalty to Jewish tradition; it means only that a discussion of Jewish responses to technology and science, inasmuch as this discussion focuses on Jewish religious approaches, will be presented from the point of view of halakhic Judaism. It should also be understood that different Jews, though all committed to halakhah, can come to much different conclusions as to the applicability of halakhah in particular cases.

One might ask: can halakhah, based on norms and prescriptions developed in a pre-technological world, deal adequately with new challenges? It has often been noted, usually by those calling for the modernization of Judaism and halakhah, that Moses could not have known, for instance, what electricity is, and, the corollary goes, if he had known what it is, he would certainly not have outlawed its activation on the Sabbath. Most traditionalists, however, have decided that the laws of the use of electricity on the Sabbath are based on the Biblical prohibition of lighting a fire on the seventh day, and, therefore, turning on an electric light is to be considered prohibited mela'kha (labor). They say that the argument of those modernizers who would allow electricity is fallacious. First of all, the traditionalists contend, it was not Moses or other humans who set down the law, but God Himself. God, being omniscient in the future as well as in the present and the past, obviously did know what electricity is when revealing the Torah. Second, the Torah did not have to mention electricity specifically, for the Written Torah, as supplemented by the Oral Torah (the elaboration of the Rabbis in the Talmud), contains the requisite principles that will govern all future developments and scientific breakthroughs. Third, the competent halakhic experts of any generation are considered authorized and capable of applying the ancient principles to new facts. True, there are often disagreements as to the exact manner in which the principles are applied, and, in many cases, there are perhaps certain unconscious non-halakhic motives which lie behind particular decisions. Who is to be considered a competent authority can also be a matter of dispute. Still, the halakhic Jew has no doubt that the Torah is inclusive enough to answer all questions. As the frontiers of science and technology expand, halakhah, like the National Geographic, will be there to record and respond to the new developments.

As we approach the question of Judaism and technology, one interesting fact is already apparent: modern technology has made life easier for traditional Jews. Advances in science and various inventions have made the five-day work week a reality in America, freeing many Jews from the obligation to work on the Sabbath. Technology has also been harnessed for Jewish halakhic purposes. In the pre-electric era, Sabbath candles lit before dark on Friday night filled the function of providing light on the Sabbath, when the kindling of fire is forbidden. They would conveniently burn out by bedtime. Now, one can employ an automatic electric timer, a devise used by the rest of the world to fool burglars into thinking that people are at home when they are really away. This so-called "Sabbath-clock" is much more effective than Sabbath candles; it can turn on the light again on Saturday afternoon as the evening darkness approaches. There was a time when observant Jews would not live in the upper storeys of high-risers because of the problem of walking up or down (mainly up) on the Sabbath. Now, they can use a "Sabbath-elevator" which stops automatically at each floor and requires no button pushing. New breakthroughs have also expanded the culinary borders of the Jew who keeps the dietary laws: non-dairy coffee whiteners, margarine, meat substitutes, and artificial cheese now allow for kosher cooking which resembles its non-kosher counterparts.

Technology has invaded other areas of Jewish life as well. One can buy tapes of Talmud lessons to put in the car's tape deck so that the daily commute turns into the daily Talmud lesson. When the commuter returns home, he can play games with Jewish content on his home computer. New technologies have helped in the proliferation of Jewish books and the preservation and availability of Jewish texts. Computers are being used also to determine the exact times of sunrise and sunset at any particular longitude and latitude so that the observant Jew will know precisely when the Sabbath begins and ends, when to say his daily prayers, or, indeed, how to calculate any of his religious requirements which are based on a knowledge of the sun's movements. Chemical techniques are used to determine if clothes contain linen and wool and thereby violate the laws of Shaatnez. When the head of Ḥabad Ḥasidism, the Lubavitcher Rebbe, makes a speech, he is hooked up by satellite and cable to thousands of his adherents world wide.

One of the most interesting developments in halakhic technology are certain electrical appliances that work on a principle called "grama", namely indirect action. Activation of the appliance is not caused by a direct act, but by certain random causation. Such indirect action has been ruled to be permissible on the Sabbath in emergency situations.[2] Thus, this principle has been used for the Sabbath call-buttons in religious hospitals, for the Sabbath flashlights of guards on religious settlements, and even the telephones of religious Israeli cabinet ministers for consultation on the Sabbath. (These latter devices are affectionally called "gramaphones.") In addition, a way has been found to permit the use of certain types of microphones on the Sabbath in large synagogues, but such systems are still controversial.[3]

Along with all these boons to Jewish law provided by technology, there are also aspects of scientific advances with serious implications for both halakhah and traditional moral values. Let us take, for example, the case of artificial insemination. As a technique for helping an otherwise infertile couple to reproduce using the husband's sperm, there is little halakhic objection, though there are halakhic guidelines for certain aspects of the procedure. If, however, the sperm comes from a donor (a strange misnomer since the "donor" is usually paid), there are serious halakhic issues. Most authorities have ruled that such insemination, though forbidden, is not adultery, and the children produced thereby are not mamzerim, i.e. children of adulterous or incestuous relationships who may not intermarry with other Jews. What, however, happens when the daughter and son of the same donor fall in love having no knowledge that they are half-brother and half-sister. Their marriage would be incest, whose prohibition is clear from the Bible. Therefore, this important development in reproductive biology is regarded suspiciously by halakhists.

In vitro fertilization is another example of a revolutionary technology whose applications can be misused from the halakhic perspective. Most authorities have ruled that, in principle, there is no problem with a husband's sperm fertilizing his wife's ovum in the laboratory for the purposes of implantation into the wife's uterus. There is, however, the problem of multiple fertilized eggs, only one of which is chosen for implantation. While Judaism does not object to abortion in the same manner as does Catholicism, it is still a problem when one destroys fertilized ova in favor of just one survivor. Furthermore, if the *in vitro* fertilized embryo is implanted not in the woman who provided the ovum but in another woman who has volunteered (or is being paid) to carry the fetus and eventually to give birth to it, who is the halakhic mother? What if the woman who provided the ovum is Jewish and the woman who carries it to term is not. Is the child Jewish?[4] The questions which result from new reproductive technology are not necessarily unique to Judaism, since religious thinkers of all denominations, as well as legislators, are grappling with similar problems. They present a uniquely Jewish challenge, however, to those who believe that the use of such technology must be based on halakhic norms of the Bible and the Talmud, and that the issues involved are not only ethical or moral in a broad sense, but also legal in terms of the *halakhah*.

There are a host of other medical, biological, or chemical questions arising out of modern science. What food additives are permissible according to the dietary laws? When is death, now that persons with no brain activity can be kept breathing indefinitely? Is any human experimentation allowable, either before death or after death in the form of autopsies? What are the laws of organ transplants? Is genetic engineering allowed? What does one do when amniocentesis reveals that a fetus has a condition like Tay-Sachs disease, which is certainly fatal; or Down's Syndrome, not fatal, but certainly unpleasant and difficult for the family; or the wrong gender, which is now becoming a cause for abortion? How should Jews react to people who, in violation of halakhah, have undergone sex-change operations or have taken the less drastic step of voluntary sterilization? What are the implications of widespread contraception for traditional moral values and for the problem of Jewish demography? What are the correct procedures in space travel for the observant Jew; must he don phylacteries every ninety minutes with each sunrise in his capsule? Many of these questions were unknown only a few short years ago; the traditional Jew assumes that halakhically suitable answers are available and, when they are formulated, these answers are the only basis for Jewish behavior.[5]

When looking at the examples I have mentioned up to now, we can see that certain aspects of technology are perceived as useful (the "Sabbath-clock") while others are seen as threatening (artificial insemination from donor). If one wanted to generalize, I think it is reasonable to assert that those aspects of modern technology most disturbing to traditional Judiasm are those which deal with biology and sexuality. Whether one uses electricity on the Sabbath or not, or whether one allows a certain food additive or not, are really secondary questions that do not have a potential for overthrowing traditional norms. It is, however, in the biological and sexual realms that the traditional Jewish values of respect for life and sexual restraint are most vulnerable.

There is one interesting case of technology which is not easily classified, namely, the television. While most Jews see no halakhic barrier to this instrument, there are considerable segments of what is usually referred to as the "ultra-orthodox" community who object to its use. When going down the streets of Bnai Brak or Meah Shearim in Israel, strongholds of this group, one sees signs placing a ban on television. Stories are heard of people who have televisions delivered to their homes in refrigerator boxes, to avoid the opprobrium of neighbors, or having specially built wall units which can camouflage the presence of a television within when a potentially disapproving visitor comes. On the other hand, the Lubavitch Ḥasidim make use of television to broadcast their Rebbe's speeches. Why the ambiguity? To a certain extent, watching television is considered a waste of time. Yet, more importantly, it would seem that television is regarded by some to be more than a neutral tool to be used for either good or bad. Rather, it is seen as a pernicious instrument which brings into the home all kinds of challenges to the traditional life style. An adolescent who is constantly being told to suppress his sexual urges certainly would be confused, to say the least, to behold in front of him a world in which sexual restraint is the exception, not the rule. Television is a window to a world which is not governed by the

Torah, a world which contains a plethora of temptations. Some deal with these challenges by excommunicating the messenger.

The discussion up to now has focused on narrow areas of technology and has asked the question: how has traditional Judaism responded to new techniques, methods, and products. The direction of the response is neither equivocal nor surprising. Technology, in and of itself, can be useful. Before certain techniques are applied, however, one must seek halakhic guidance as to their permissibility. In no case should technology be allowed to get out of hand to serve anti-halakhic purposes. Technology should serve man, not call into question his moral values.

When we move to the realm of Judaism and science, the questions become more difficult and the answers less clear-cut. We are no longer asking how Judaism responds to the fruits of research, but to research itself; not to scientific discoveries, but to science. Since this is a matter more of theology than of practice, there is a much greater leeway in dealing with it. Despite various historical attempts at formulating dogmas which would be binding on all Jews, there have never been well-defined guidelines as to what a Jew must believe and what he may not believe. Therefore, openness to science and scientific method is not an halakhic issue _per se_, and one can discern within traditional Judaism a wide range of opinions.

Before proceeding further I would like to note that, for my purposes here, the terms philosophy and science will be used more or less synonymously as systems of truth produced by human reason. In the modern period, science (from the Latin for "knowledge") has become separated from philosophy (from the Greek for "love of knowledge"), because the former is usually empirical and deals with physical objects while the latter is usually non-empirical and deals with non-physical objects. Universities often segregate the two disciplines into different colleges or faculties. In the pre-modern period, however, knowledge and love of knowledge were seen to be part of a unity. Even though mathematics, physics, and metaphysics were considered different sciences, with mathematics leading to physics leading to metaphysics, they were all way-stations on the path to truth. This truth was discoverable by human reason, unaided by divine revelation. At the same time, divine revelation was also seen by most pre-moderns as a source of truth. The "faith and reason problem" has its origin in the perceived contradictions between these two truths.

The challenge of science to Judaism is not as old as the challenge of technology. When Israelites met Canaanites on the physical battlefield, the war was between new technology and old technology. When the two met on the spiritual battleground, the war was between ethical monotheism and idolatrous polytheism. Though the question of monotheism versus polytheism has philosophical ramifications, the ancient Israelites, just as much as the ancient Canaanites, were not equipped to discuss the issues philosophically.

Even in the rabbinic period (200 BCE-500 CE), when hellenism under Greek and Roman conquerors was making an impact upon Judaism, the Rabbis still did not adopt philosophical or scientific methodologies and approaches. They were too preoccupied with formulating the halakhah and showing its explicit relationship to the Biblical legislation. In fact, the rabbis were aware that in certain features of science, e.g. in medicine or astronomy, they sometimes lagged behind their non-Jewish conquerors. Nevertheless, a direct clash in Rabbinic Judaism between Judaism, as a supernaturally revealed system of truth, and philosophy, as a humanly discovered system of truth, was postponed.

There was one Jewish thinker in this period who left written records of his attempts to deal directly with the issues of faith and reason. Philo Judaeas of Alexandria (c. 20 BCE-45 CE), who wrote in Greek and whose treatises were preserved by the Christian Church and not by Jews, was a committed Jew and a committed Platonist. He saw no conflict between the two sources of truth. If the literal meaning of certain Biblical passages is philosophically indefensible, then the passages are to be taken allegorically. If Plato's view of creation out of prime matter impugns on the Biblical notion of an absolutely supreme God, then Plato must be understood as teaching the prior creation of prime matter ex nihilo, before the creation of the world out of that prime matter. Philosophy is seen as ancilla theologiae, the handmaiden of theology, who serves her mistress faithfully. Revelation and reason shared the same content and, therefore, no conflict could arise between them.[6]

The Philonic synthesis had no immediate impact upon Rabbinic Judaism, but it does seem to have influenced early Christianity.

The Church Fathers faced a dilemma similar to Philo's: how to reconcile the revelation of their new religion with the truths of reason. This problem was particularly acute since early Christianity presented itself to a philosophically trained hellenistic world which assumed the teachings of philosophy to be true. Pagan Greek philosophy was amalgamated into a Christian world view, and the problems of faith and reason were reconciled once again. Still, not all pagans became Christians, and a number of hellenistic philosophical academies were able to survive the conversion of the Roman Empire.

With the emergence of Islam in the seventh century and its conquest of the Middle East, a new scriptural religion came into contact with the claim that Greek philosophy is a source of truth. Both Christian and pagan philosophers made their impact upon the emerging religion and its new-found awareness of the faith and reason problem. The result was the Kalam (literally, word or discourse) which adapted Greek philosophical techniques to defend Muslim theology. In the ninth and tenth centuries, Jews living under Islam became aware also of the challenges presented to Judaism by philosophy, and the enterprise known as Medieval Jewish philosophy was born.[7]

There were a number of approaches taken by the medievals to the questions of faith and reason. The harmonizers, represented by such thinkers as Saadia Gaon (882-942), Maimonides (1135-1204), and Gersonides (1288-1344) saw no conflicts between the two sources of truth. Saadia claimed that a correct use of human reason would result in an acknowledgment of the truth of Judaism. The existence of God is demonstrated by proofs that the world was created, and, hence, there must be a creator. True, there were philosophers in his time who followed Aristotle and believed that the world is eternal and uncreated. Saadia, however, relied on the proofs of the sixth-century Christian critic of Aristotle, John Philoponus, as mediated by Muslim Kalam, to refute the claim of eternity. These proofs were hardly convincing, and Maimonides was later to brand them as unscientific. What is important for us is Saadia's confidence that no conflict existed between the truths of faith, accepted because the prophets had announced them, backed up by miracles, and the truths of human reason. Though this assurance was reinforced by Saadia's refusing to admit the possible truth of any proposition which contradicted revealed doctrines, we can still discern a commitment to the harmony of religion and reason.

The greatest medieval Jewish harmonizer of philosophy and religion was Maimonides. His Guide of the Perplexed, which became controversial as soon as it was composed, aimed to demonstrate the intellectual respectability of Judaism to the philosophically trained wavering Jew. The work was not intended for the uneducated masses who were not troubled by the questions dealt with here. Rather, the Guide was addressed to those who felt that the truths of philosophy disagreed with the teachings of the Torah.

Maimonides' position is fairly simple: there can be no contradiction between the two truths. If philosophy can convincingly demonstrate a particular proposition, then that proposition is obviously taught by the Torah as well. It is philosophically impossible (i.e., it is impossible) for God to be corporeal. All Biblical verses to the contrary are allegorical. Much of the confusion which besets the scientifically trained individual who reads Scripture (which are intended both for the ignorant masses and the intellectual elite) is caused by his inability to realize that prophets use equivocal language. The truth of philosophy (i.e., the truth) is plainly taught by the Bible if one has the correct guide (Guide?) to the text.

A crux of Maimonidean interpretation is his true position regarding the origin of the world. This was a central concern for medieval thinkers, since the scientific, i.e. Aristotelian, approach taught that the world is eternal, the laws of nature are immutable, and God is not a willful agent. It would seem that such a theory would destroy the foundations of religion. Maimonides, knowledgeable of the consequences of the Aristotelian position, went to great lengths to show that Aristotle and his commentators had not proven their case and that creation of the world after non-existence is equally as plausible as eternity of the world. Many commentators, from the thirteenth to the twentieth centuries, have argued that this is not Maimonides' true position, and, in the final analysis, he accepted the Aristotelian doctrine.[8] Whatever the case, Maimonides is clear that if eternity of the world is to be rejected, that is not so because of Biblical restraints; the gates of interpretation are never closed. If Aristotle had proven his point, the Bible could be interpreted to agree with him. The implications of the harmonistic position are clear: if reason/philosophy/science can demonstrate beyond any doubt the truth of a certain proposition, then this proposition is indubitably taught by the Torah. There is only one truth, and Judaism, as a true religion, maintains that truth no matter how far away from it, prima facie, the words of the Bible or the Rabbis seem to be.

Gersonides went further than Maimonides in accepting the results of philosophical speculation. He rejected the traditional interpretation of God's knowledge and providence, and he argued that the world was created out of prime matter. At the same time, though, Gersonides was careful to show that the Bible and rabbinic literature could be interpreted in accordance with his own philosophical views.

The harmonistic position aroused great antipathy among those who could be called rejectionists for their uncompromising support of traditional doctrines and their opposition to the use of philosophy. The Maimonidean position was especially threatening because of the great authority wielded by Maimonides by virtue of his halakhic works. His followers were more vulnerable, and they were accused of theological heresy and halakhic laxity. The Maimonidean controversies of the thirteenth and fourteenth centuries erupted around the question of the status of philosophy and reason. Various bans were placed on Maimonides' philosophical works and on the studying of "Greek wisdom" (except medicine). The rejectionists did not go so far as to say that all Biblical verses, including those which indicate divine corporeality, should be taken literally. Their position was basically that tradition, i.e., the Bible and the Talmud, was the only source of truth. One should not judge the tradition by extra-traditional canons; theological speculation must be received truth. This is the reason that Jewish mysticism, which strikes us as a daring innovation, is called Kabbalah, received tradition, and its major work, the thirteenth-century _Zohar_, is pseudepigraphically attributed to a second century rabbi. Faith and reason present no conflict; only faith can be relied upon to provide truth. Inasmuch as secular learning claims to be a source of knowledge, it is suspect and to be avoided.

There was also a moderate position which, to an extent, accepted philosophical methodology but tried to keep its applications within bounds. This position is represented by Judah Halevi (d. 1141) who had no use for those who wished to place Judaism on a rational basis. To his mind, a God whose existence could be demonstrated is merely an idea which is useful solely for conventional, man-made religions. In contrast, a true divine religion's validity depends upon first-hand empirical knowledge of God through his revelation and miracles. Though nothing in a revealed religion could be irrational (refutable by reason), there were certainly non-rational (neither provable nor refutable by reason) elements in such a religion. A test of a religion's possible divinity would then be not its being proved by reason, but reason's inability to disprove it.[9] As for the claims of science which contradict tradition, they are not convincing. Thus, Aristotle's error in assuming the eternity of the world was a consequence of his Greek heritage which was bereft of the truth provided by revelation. If he had grown up as a Jew, he would have known the truth and would have argued for creation, not eternity. The Torah teaches explicitly that the world was created, and that doctrine must be upheld. At the same time, Halevi made a surprising admission: the exact details of creation, namely ex nihilo or from prime matter, are secondary and open to rational discussion and scientific investigation. Still, one must remember that unguided human reason is not sufficient to determine the truth of the origin of the world. Only revelation can fulfill that function.

Similar moderate views were held by other medieval Jewish philosophers. Ḥasdai Crescas (1340-1410), for instance, was led by his orthodoxy to reject Maimonides' Aristotelianism, but his rational bent caused him to adopt some rather non-traditional doctrines, such as eternal creation. It is important to remember that for all their anti-philosophical rhetoric, Halevi and Crescas are still part of the rationalist school of Jewish thought. They were just not willing to go as far as Maimonides in accepting fully philosophy's claims to absolute truth.

In our own day, the medieval debates have been transferred into the modern arena.[10] The questions are more or less the same; if science teaches one belief (e.g., evolution or the immutability of nature) and the Torah seems to teach another belief (e.g., creation of miracles) how is the traditional Jew to evaluate the claims of the two systems? Are contradictions possible or can any apparent discrepancy be reconciled? Which carries more weight: tradition or reason?

Those who have adopted the harmonistic approach follow the path of Maimonides. They argue that scientific research of any kind is to be welcomed, because it leads everyone to a greater understanding of the truth. There are no theological stances which are threatened by disinterested research, for whatever conclusions are reached by scientists can be accommodated by reinterpretation of traditional concepts (but not halakhic norms). If science teaches that the world is millions of years old, then Genesis can be interpreted to mean just that. As Maimonides taught, miracles and prophetic visions of the supernatural do not have to be taken literally. It is assumed that certain central beliefs, e.g., the existence of God or revelation on Mt. Sinai, are scientifically unassailable. After all, even if the existence of God cannot be proved, it also cannot be disproved. Revelation was an historical event: whether it occurred or not is not amenable to rational demonstration. What exactly is meant by revelation is, however, a possible topic for discussion. As a result of such an outlook, harmonizers feel that the pursuit of truth in secular institutions, even in anti-religious environments, is not a challenge as long as the student is strong enough in his basic commitments to Judaism. There is even the possibility of a scientific study of religion, despite the problematics for a believing Jew.

The rejectionist approach is one of suspicion regarding all secular learning, especially the speculative sciences. Proponents of this view often offer the following argument: The Torah has remained unchanged for 4000 years, but science is always changing. Therefore, one must rely upon the Torah and not upon science. Furthermore, only Torah study is valuable in and of itself; all other educational pursuits are, at most, somewhat utilitarian. Therefore, college education is discouraged, if not banned outright. Colleges are seen to undermine religion both because of the subjects taught and their anti-religious environment (intellectually and culturally). If there are professional reasons for pursuing a degree, then one should study Torah during the day and get degree credits at night (and preferably convince the university to recognize Yeshiva courses for credit). Accounting and computers are considered safe subjects; biological sciences and humanities (especially Jewish Studies!) are considered unsafe. The degree on the wall should not mean that the value system of the university, namely, free scientific research, has penetrated the consciousness of the graduate. The only source of truth is Jewish tradition; at most, science can be a useful tool. It has no independent status as a source for truth.[11]

There is another approach to the questions discussed here, and it would be tempting to identify it with the moderate rationalism of Halevi or Crescas. I believe, however, that it is really a more sophisticated rejectionism masquerading as rationalism. Jews who follow this route actively seek out and combat those scientific theories that seem threatening to traditional Jewish beliefs. Thus, for example, in certain segments of the Jewish community, as in the fundamentalist Christian community, scientific ways are being developed to fight against the theory of evolution and to support creationism. Religious Jewish scientists (many of whom became scientists before they became religious, since Jews of this persuasion tend to oppose college education as pointed out above), convinced that the Torah's account of creation is true, have decided that any other view of the origin of the world must be false. Not wishing to challenge the validity of science *per se*, since they themselves are scientists (although usually not in biology), they use scientific method to fight what they perceive to be incorrect science.

This latter approach has become quite popular among those Jews who wish to claim scientific respectability for traditional Jewish beliefs. What is missing, though, is any willingness to moderate or reinterpret the tradition in light of advancing scientific discoveries. Judah Halevi's flexibility permitted him to allow either creation *ex nihilo* or creation from matter; a modern rationalist, for whom scientific method is valuable, might be willing to accommodate evolution. The sophisticated rejectionists mentioned here are unwilling to subject even the traditional counting of the age of the universe to revision or allegorization. For all the scientific veneer, the bottom line remains: only the Torah is a source of truth; science must not be allowed to threaten traditional Jewish beliefs.[12]

The above descriptions of Jewish approaches to faith and reason are obviously generalizations, but I feel that they represent a cross-section of opinion among traditional Jews. It should be noted that the issues discussed here have more than academic ramifications. Thus, those who take a harmonistic position *vis-à-vis* science often tend to be more lenient in their halakhic pronouncements and more willing to take modernity into account in their daily life styles. Similarly, those who follow the rejectionist line usually oppose all halakhic compromise, even in areas where the halakhah is not clearcut. In like manner, they reject other vestiges of modernity in such areas as their mode of dress, courtship, and cultural activities, while, at the same time, they are willing to adapt modern technology for religious usages. The scientific approach is eschewed specifically because it is seen as threatening to tradition, and rejectionists can point to non-halakhic Jewish movements or the halakhic leniency of the harmonizers as evidence that acceptance of science leads to dangerous results. The harmonizers, for their part, argue that accommodations to science and modernity are not compromises with the religion but are in accord with the best traditions of Judaism. True Judaism is not obscurantism, reason is divine, and modernity is not bad just because it is modern.

Since this debate has been going on in Judaism for over 1,000 years, it is unlikely to be settled soon. It would seem that as the twentieth-century ends and the salvational hopes of science fade, rejectionism is becoming more popular even among college-trained professionals. From this point of view, if there are no beliefs of religion which go beyond human reason, then one might as well be just a scientist, not a believing Jew. Religion becomes attractive just because it makes claims to certainty which science cannot do. The harmonistic view is seen as too cold and sterile, too scientific if you will, and not sufficiently religious. As the halakhic Jewish community moves to the right in matters of halakhah (and observance of longforgotten stringencies becomes a test of piety), it is also moving to the right in matters of faith (and belief in certain theological positions also becomes a test of piety). This may be a passing phenomenon or it may be a permanent trend. Whatever the case, the day when Jews can keep to the hill country and thereby avoid the challenges of technology and science are over. How one deals with the issues, though, is still an open question, one upon which believing traditonal Jews may legitimately differ. The various answers of the past give guidance for the present and the future.

Notes

1. Thus, Orthodox Judaism's general opposition to abortion would seem to be rooted in the desire to conform to the Jewish tradition, while Reform Judaism's general support of abortion appears to be based on motives other than a desire to conform to Jewish tradition. To be sure, each might claim that its position is the genuinely Jewish one, and it is also possible to detect extra-halakhic motives in the oppositon to abortion, as well as halakhic ones in support of it. Nevertheless, it is safe to say that those inside the halakhic framework (which is not necessarily synonymous with what is known today as Orthodoxy) are closer to the classical understanding of the Jewish religion, and they will be the focus of this paper.

2. It seems to me that efforts to find halakhically acceptable appliances for emergency situations are unnecessary. If there is a real life-and-death emergency, regular appliances can be used; if there is no emergency, the "grama" ones cannot be used. Those involved in this research claim that even if halakhically one may violate sabbath laws for an emergency, an effort should be made to reduce such infractions. Furthermore, traditional Jews would feel no qualms at all in using "grama" appliances, while they might be unwilling to use regular ones even in emergencies. Thus, the availability of such instruments contributes to saving lives.

3. Much of this work has been done by the Institute for Science and Halakhah located in Israel. A number of Hebrew volumes have

been published, especially in the area of electricity and halakhah (not just in terms of Sabbath usage).

4. The tentative conclusion seems to be that motherhood is determined by parturition, not by conception. Since many of these questions are so new, the final adjudications are still pending.

5. Many of these topics are discussed by J. David Bleich, Contemporary Halakhic Problems, New York, 1977; II, New York, 1983; and Fred Rosner and J. David Bleich, eds., Jewish Bioethics, New York 1979.

6. For Philo's synthesis and influence on all future religious philosophy, see Harry A. Wolfson, Philo, Cambridge, Mass., 1947. Not all have accepted Wolfson's view of Philo's originality and contribution to medieval philosophy.

7. See Julius Guttmann, Philosophies of Judaism, trans. D. W. Silverman, New York, 1969; and Isaac Husik, A History of Medieval Jewish Philosophy, Philadelphia, 1940, for overviews on Medieval Jewish philosophy.

8. For the latest contributions to this long debate, see Herbert Davidson, "Maimonides' Secret Position on Creation," in Isadore Twersky, ed., Studies in Medieval Jewish History and Literature, Cambridge, Mass., 1979, pp. 16-40; and Warren Z. Harvey, "A Third Approach to Maimonides' Cosmogony-Prophetology Puzzle," Harvard Theological Review, 74 (1981): 287-301.

9. A similar view was held by Jewish philosophical polemicists against Christianity in fourteenth and fifteenth century Spain.

See my "Averroistic Trends in Jewish-Christian Polemics in the Late Middle Ages," Speculum, 55:2 (1980): 294-304.

10. I will restrict myself again to those Jews committed to the observance of halakhah, since, even though there are those who have used the harmonistic view to argue for reforms in Jewish practice, this is far from the intentions of the medieval halakho-centric rationalists. In passing, though, it should be noted that non-traditional forms of Judaism have few qualms about accepting the scientific method and its results. The misuse of science and technology for immoral ends is, however, of concern for Jews of all religious denominations.

11. For views about college education, see William B. Helmreich, The World of the Yeshiva, New York, 1982, especially pp. 220-238. It is somewhat paradoxical that those who reject secular education are willing, if not eager, to use the technological advances produced by such education. Even the study of medicine, a traditional Jewish occupation, is discouraged because of possible halakhic violations involved (e.g., anatomy, being on call on the Sabbath). The study of Torah is seen as the only worthwhile educational pursuit despite the obvious benefits of scientific research.

12. A collection of essays, mostly from the camp of sophisticated rejectionism, were edited by Aryeh Carmell and Cyrlil Domb in Challenge: Torah Views on Science and its Problems, London/Jerusalem, 1976.

SCIENCE AND RELIGION:
CONFLICT AND PARTIAL RECONCILIATION

Norman P. Melchert

Along the way to knowledge,
Many things are accumulated.
Along the way to wisdom
Many things are discarded.*

My topic is this: what is it reasonable to think about the relations of science and religion, now that we find ourselves in the last fifth of the twentieth century?

This is a large topic, and I cannot pretend to be able to do it justice -- especially in such a brief compass. I shall try to sketch the outlines of a point of view, with occasional reference to the talks that preceded this one in the series.

Apparently it was very early in the history of human beings that ancestors of ours began to wonder -- as we also wonder -- what sort of place is this in which we find ourselves? And what sorts of creatures are we who live here? They began to make distinctions, tell stories, give explanations, and groped toward more or less coherent visions, images, and pictures, which made sense of the world they had to deal with. What an enormous jumble of dangers and benefits, pains and pleasures, deaths and lives, sights, sounds, feelings, dreams, illusions, needs, urges, terrors and ecstasies they had to order and find a place for!

There is a feature of virtually all of these early attempts to understand which I want to focus on. They understood the human world and the sub-human world in the same terms. It was a world of wills, intentions, purposes -- in short, a world of persons. In and behind the stars, storms and strivings of men and beasts were will and purpose. Of these wills, some were more powerful than others. These were the gods, and they had to be accommodated. One needed to know what they wanted, what their intentions were, and how to appease them if their wills were crossed.

---

*Benjamin Hoff, THE WAY TO LIFE AT THE HEART OF THE TAO TE CHING. Weatherhill, New York, p. 43.

Through a long period of "winnowing," to use Donald Campbell's term, visions of great sophistication and power, embodied in the West in the three great monotheistic religions became dominant. But still will and purpose were basic. Human beings played the central role in the drama of the universe. How they played the parts assigned to them determined the meaning of their lives. And all the rest was stage setting. These visions were expressed in writings that later generations have taken to be authoritative. And therein lies one half of our problem.

Quite late in our history, in classical Greece, there developed another way of making sense of the world and our place in it. There were a few who refused to take traditional answers as authoritative, who ventured to answer these old questions by thinking for themselves and paying close attention to the phenomena of the world.

This tradition of independent intellectual inquiry into the natures of things, after many false starts and centuries of neglect, eventually blossomed in what we know as modern science. The view, image, or vision it has yielded to date is in stark contrast to that of the great religions. It is not intellect, purpose, and will that are the key features of the universe, but an impersonal causal order. Nor is human being at the center of things. The words of Bertrand Russell in 1959 express it perfectly:

> I accept without qualification the view that results from astronomy and geology, from which it would appear that there is no evidence of anything mental except in a tiny fragment of space-time, and that the great processes of nebular and stellar evolution proceed according to laws in which mind plays no part.

What is most crucial for our story, of course, is that this view is not enshrined in any authoritative books, to which we can appeal to settle disagreements. In principle, any substantive claim is open to revision -- however well ensconced some of them may be, and however conformist individual scientists may be. And a revision, if it conforms to the rules of this game, should be made on grounds that are public and open to all who can inquire -- however difficult an ideal that may be to practice.

Notice now, that we have a double conflict: First, between two procedural ideals, obedience to authority, on the one hand, and independent inquiry on the other. Call this a conflict of METHODS. And second, two substantive views of the world and our place in it, one dominated by concepts of purpose and meaning, the other apparently void of such concepts. Call this a conflict of CONTENT.

It is of some importance, I think, to notice that these conflicts are independent of one another. It could have turned out that scientific inquiry gave us, as its best guess in response to our original wonder (and even the best confirmed theories have the logical status of guesses), that our world is ordered in terms of purposes. And the vision offered by physics might have coincided to a large extent with that offered by the traditional religions. This might have happened if some central concepts in the best explanations of the sciences had contained in an ineliminable way a teleological or purposive character. The best explanations of the course of things in the world might have essentially contained a theoretical construct roughly equivalent to the traditional concept of God. (This would be no stranger than some of the concepts actually postulated in modern physics to explain the way things happen.) Had this been the case, we would have a persuasive and powerful argument for the existence of God. This would have been a really good reason to believe in God, quite unlike the short snappy proofs prominent in the tradition. For in this case, we would not be able to explain, in detail, the course of the world, without reference to the purposes of the being postulated in that concept. This seems, however, not to be the case, and our best explanations do not include such a concept.

It is important to recognize the duality between method and content for two reasons. It shows us that what is FUNDAMENTALLY at stake in the conflict between science and religion is just what Steven Goldman said it was -- the opposition between two different methods of "fixing belief," and not the results reached by either method. The conflict is rooted not in two different world views, but in the opposition between appeal to authority and independent inquiry. Secondly, it refutes any charge against science, or independent inquiry, of essential impiety. For if I am right, science could have turned out to confirm the traditional answers to our questions. It did not. And I think we are therefore justified in believing -- provisionally, and subject to correction by future investigation -- that this result is a reflection of the way the world is.

I take it then, that both religion as we have it and science as we have it intend to give answers to our original questions: what sort of place is this we find ourselves in, and what sort of creatures are we? Although their answers might not have been in conflict, in fact they have turned out to be so. And so far as I can see, the various attempts to reconcile them by denuding them of their claims to tell us "how it is", positivism, phenomenalism, and instrumentalism in science, demythologizing and "god is dead" theology in religion, all fail.

Moreover, the possibility that we might consider science and religion alternative theories which are empirically equivalent seems no better. To call them empirically equivalent is to say that they have all the same experimental consequences; whatever can be predicted on the basis of one can be predicted on the basis of the other. Particle and wave theories in physics, I am told, are empirically equivalent in this respect.

But it seems to me that the religious "theory" is not at all on a par with the scientific theory. For it is the scientific theory, as in the case of evolutionary science, that does all the work. If religion comes along after the work is done and says, yes indeed, that is how God does it, it hardly seems to be an equivalent THEORY.

If, then, there is an apparent conflict between science and religion, and if the standard attempts to reconcile them fail, then it seems the conflict is more than merely apparent. And then we have to choose.

Or do we? Goldman suggests that we can live in incompatible frameworks; indeed, that doing so is part of a "mature" life. And Professor Campbell tells us that it is ok to be scientific in the lab and religious at home. But I think that is a makeshift, a second best. It seems to me that maturity involves an attempt at a kind of integrity, an integration, a wholeness to one's life akin to what the great religions call salvation. And I think this is something worth striving for, even though its realization may be only partial.

So I think we do have to choose. And the basic choice is between the ideal of appeal to authority on the one hand and the independent inquiry characteristic of the scientific ideal on the other. (I speak in terms of ideals here because I want to avoid a mistake often made, of contrasting the ideal of science in its pristine purity with religion as it actually exists, distorted by the particular passions and failings of its practitioners. Or, for that matter, of contrasting ideal religion with real science.) It is between conflicting ideals governing our search for answers to the questions we started with that we must choose.

If this is the choice, I think it must be science that we choose. The reason is this. Authorities disagree. To criticize other authorities from the point of view of one of them is arbitrary and unfair. To suppose that there is a point of view outside them all from which to choose among them is to abandon the notion of authority. So either we are condemned to arbitrariness or we give up the ideal of settling our beliefs by appeal to authority. If, then, we wish to avoid arbitrariness as much as possible, we must choose a method of settling beliefs where, in principle, anything can be questioned, doubted, and rejected.

But if we choose the way of independent inquiry, we must take seriously the point to which it has brought us. Russell's description seems to be the right one. But that brings us face to face with another question. Can one LIVE in a world like this? That is a pressing question in two senses. How can I manage it at all, now that I know there are no rules laid down, no goals set for us? Are we not, to use Camus' language, "undermined"? And, given that I do manage somehow, in what way shall I live?

At this point I want to look again at religion. Not, now, for an answer to the question, what is the world like, but with an eye to what it might tell us about how to live in a world such as that revealed by the sciences. It was Walter Kaufmann, self-proclaimed heretic and agnostic, who said somewhere that religion says one thing to us, insistently, urgently: you must change your life. No one, I think, has ever said it more clearly or elegantly. You must change your life. He reflects the prophets' rebukes, John the Baptist's cry of "repent," and the Buddha's long quest for enlightenment. One finds in all the great religions this deep sense that something is desperately wrong with us, an analysis of what it is, and a promise that transformation, healing, salvation is possible.

They do this in different ways, from different cultural angles, and the results are not precisely the same in all the great religions. But they all promise a point of view independent of self, profession, sex, nation -- all those more limited unities with which we identify. They promise freedom from narrow self-concern, from domination by anxiety or resentment. They offer a kind of integration of life, a wholeness, a kind of harmony internally and externally. In short, they promise a way to get beyond what Nietzsche called the "human, all too human."

To be sure, religions themselves have often enough failed their own ideals. And those who remind us of the great evils that have been wrought in the name of one religion or another, remind us of what cannot be denied. Religion is powerful stuff, and so capable of both great good and very great evil. There is a great deal in the practice of religion, it must be admitted, which is the fruit of fear, anxiety, weakness, and resentment. No one showed us this more clearly than Nietzsche. Yet there is the promise. And, occasionally, the fulfillment.

Let me speak only of Christianity for a while. (I think roughly analogous things can be said about the other great religions, but I speak of what I know best.)

Here I want to make two points. First, Christianity is committed to one God, who is creator of all that is. This God is also giver of the Law and a just judge. God, we read, is impartial; he is no respecter of persons. And what God requires of his creatures is a justice, motivated by love, which mirrors this impartiality. We find this reflected in the answer Jesus gives to the question: what is the greatest commandment? Love God with all your heart, Jesus says, and your neighbor as yourself. In Works of Love, Kierkegaard called the latter sort of love "duplication." The commandment acknowledges that we love ourselves, and does not condemn that. What it requires is that that love be duplicated, so that we love others, care for them, and watch out for their welfare as we do for our own. In this way we solve the problem of selfishness and the problem of self-hatred in the same stroke. For, Kierkegaard tells us, "when the commandment is rightly understood it also says . . . 'Thou shalt love thyself in the right way.' . . . Hence the law is: 'You shall love yourself as you love your neighbor when you love him as yourself.'"

This is the ideal of life Christianity puts before us, that we might be "imitators" of God in this respect.

But, secondly, Christianity promises that this "duplication" is a real possibility for us because of what God has done for us in Jesus, the Messiah. It is put in a variety of ways -- the paying of a ransom, the perfect sacrifice, accepting our punishment vicariously -- but the upshot is that we are forgiven our wickedness, failings, shortcomings, sin. And as Paul Tillich put it, we are accepted by God even though we are -- according to the ideal standard -- unacceptable. This makes it possible for us to accept ourselves, and others as well.

Christianity, then, looks at us as we are, and says: you must change your life. And it promises us that, with God's help, we can.

Now suppose that we have made the choice of commitment to independent inquiry in trying to answer our original questions. Suppose we model ourselves on Socrates, who says that he is "the kind of man who listens only to the argument that on reflection seems best." And suppose we are convinced that such independent inquiry, realized in the sciences, has led to a view of the world which does not contain a single center of just and benevolent purpose. What are we to make of these claims and promises of Christianity?

I want to suggest that, though in one sense they cannot be accepted, there is another sense in which they can -- indeed, perhaps should be accepted.

Christianity offers us a point of view, God's point of view, which is "transcendent." And it promises that we can participate in that point of view, that it can become ours, embedded in our lives so that it is no exaggeration for Paul to say, "I live, yet not I, but Christ lives in me."

But there are two senses of "transcendence." Let me try to distinguish them. To "transcend" means literally to "climb over," and so to "go beyond." To speak of transcendence is to claim that there is something beyond or on the other side of something else. On the other side of what?

In the first sense we think of transcendence as indicating something, some being, beyond nature, or the natural. Let us

108

call this the "metaphysical" sense of transcendence. There is a problem with this notion. Since transcendence is understood in terms of nature, as being beyond nature, as not being nature, any identification of something as transcendent in this sense seems to depend on a thorough understanding of nature. For how can we tell that something is transcendent, or a manifestation of the transcendent, unless we can eliminate the possibility that it is natural -- i.e., that it can be explained in the same terms as admittedly natural phenomena. But since our understanding of nature is, as I expect we all agree, far from adequate, we can never be certain of any phenomenon that it does not have a naturalistic explanation. The identification of something as "transcendent" in this metaphysical sense, then, is always in jeopardy from advances in our understanding of nature.

But there is a second sense of "transcendent" which is less problematic. Call this a "moral" sense. What is transcended here is not nature as a whole, but the partiality of each individual to his/her own cause, which is so much a part of human nature. Perhaps, as Donald Campbell suggests, there are sociobiological explanations for this partiality, this selfishness of the individual. If so, they certainly correspond well with what the Christian tradition calls "orignal sin." This sense of transcendence, then, need not take us beyond nature and what the sciences can tell us of nature.

Evolution, to take now the scientific point of view, seems to have produced in human beings a kind of creature that can take an impartial point of view. For human beings are, as Aristotle says, rational animals. We have a capacity, as we might say, to participate in "the order of reasons," which we might, without stretching much, also call the "logos". To be sure, we are a part of the natural world, and are subject as well to "the order of causes." But it is our ability to reason which makes available to us a point of view for judging and organizing our lives that transcends our narrow, selfish impulses.

Let me expand a bit on this latter point. Human beings seem to be capable of acting "for reasons." They do not just react blindly to their environment, but are able to ask, with respect to what is impinging upon them: "What should I do about this? How should I feel about this?"

If a person, Jones, let us call her, faces an alternative and asks, "What should I do here?" she can -- though she need not -- deliberate. Suppose she does this; she assembles reasons for doing and not doing a certain action, A. She decides to do A. And let us imagine that her reason is just this: doing A will be best for her. If this is all there is to it -- i.e., if no considerations about how her doing A affects other people have any weight at all for her -- we can say she is acting selfishly. For to act selfishly is just to act in disregard of any impact on the needs, desires, and preferences of others.

But so what? Many of our students would say, if that is what she thinks is good, what more can we say? How can reason help here? Well, remember that Jones' action is not just a reflex. She offered a reason why A was the best thing for her to do. Her reason was that doing A would benefit her. One thing that we can do here is to ask Jones, "What is so special about you, that your benefit alone, without regard to the consequences for others, justifies your doing A? Don't other people count as much as you?"

Now Jones can answer in one of two ways. She can either tell us something that does make her so special that her desires should be satisfied no matter what effect that has on the welfare of others -- but it seems extremely unlikely that she will be able to do this. Or she can say, "I'm doing what's best for me just because it's best for ME." Reasons being what they are, however, if a reason is a good reason for Jones to do something it is a good reason for Smith to do the same thing. And we can point out to Jones that if SHE acts on that reason, she can, logically, have no complaint if Smith acts on an analogous reason and completely disregards her interests in deciding what to do. This she is not likely to accept, and we have given her a reason not to act selfishly. We have given her a reason to adopt an impartial point of view.

My point is this. Participation in "the order of reasons" provides us with an impartial point of view -- call it, in its practical applications, "the moral point of view." The possibility of taking this point of view is given with our status as rational animals. And it is a point of view from which something like Kierkegaard's "duplication" can be justified. It provides a platform from which to pick out and criticize human behavior in a way remarkably similar to the answer of Jesus, that we should love God (the transcendent) and our neighbor as ourselves. (To love the transcendent in the moral sense is to "delight" in participating in the impartial moral point of view;

as the Psalmist says, "My delight is in the law of the Lord.") This explains one motivation, I think, of those who hold, as many theologians have held, that our being rational creatures is at least one aspect of our being made "in the image of God."

There is much more to be said along these lines. In particular it should be said that the ability to take this point of view does not guarantee that we will do so whenever it is appropriate. And even when we do, I do not claim it will solve all our existential and moral problems with one stroke. But the identification of such a point of view does provide us with a sense of "transcendence" which is meaningful, practical, and remarkably in accord with central themes in Christianity.

Now, if we make the distinction between the two senses of transcendence, it seems that we may consistently reject the metaphysical interpretation and keep the moral. If so, we can claim to preserve one of the major strands of Christianity, even if we adopt the picture of the world offered by modern science.

This is still pretty thin however. The depths and riches of religion seem still be be unavailable. For what Christianity promises is not just a point of view, but the possibility of a thoroughgoing, integrated adoption of that point of view into our lives. It promises us a new life, founded in a new birth -- in short, a new creation in which our basic desires and motivations are transformed. And it promises that on the basis of a frank acceptance of the metaphysical reality of God's action in his Son, Jesus, the Messiah.

It is here that the clash between authority and independent inquiry is sharpest. For it is clear that this story, understood in realistic terms, has not got a ghost of a chance of being validated by scientific inquiry. So much is usually insisted upon even by the persons who accept it; it is, they tell us, a matter of faith. The problem here, as I indicated earlier, is that there is not just one such story, proposed on authority, to belief in which one might leap. There are many, and they do not agree. And to "leap" in one direction rather than another involves an unjustifiable arbitrariness.

If, as Albert Camus puts it, we want to "stick to what we know," is there any possibility of recovering the life which the New Testament calls life in the Kingdom of God? In his novel, The Plague, one of Camus' characters asks whether it is possible to be a saint without believing in God. That is the question we are now faced with.

Camus' Dr. Rieux in that novel comes about as close as one could to that description. Patiently, persistently, selflessly, he fights the plague, working incredibly long hours to relieve suffering, and without any thought of reward. It is not that he actively disbelieves in God. But he thinks only of the plague, which he is fighting with all his skill and energy; and of those he can help. He does not contradict the believer in anything the believer says. But he thinks, as Wittgenstein might say, "in a different way." He has other thoughts, thoughts of a different kind. They are, in fact, thoughts appropriate to a scientific world view.

Still, it would be hard to deny that if Dr. Rieux were to come before the final judgment, as Christians think of it, and judgment were rendered on the basis Jesus describes in Matthew 25 -- it would be hard to deny Dr. Rieux would be justified. For what does Jesus there say?

> Then the king will say to those on his right hand, "You have my Father's blessing; come, enter and possess the kingdom that has been ready for you since the world was made. For when I was hungry, you gave me food; when I was thirsty, you gave me drink; when I was a stranger you took me into your home, when naked you clothed me; when I was ill you came to my help, when in prison you visited me." Then the righteous will reply, "Lord, when was it that we saw you hungry and fed you, or thirsty and gave you drink, a stranger and took you home, or naked and clothed you? When did we see you ill or in prison, and come to visit you?" And the King will answer, "I tell you this: anything you did for one of my brothers here, however humble, you did for me."

Are there people like Dr. Rieux? Or is he merely a figment of Camus' imagination? This is, I take it, an empirical question, and I can not say that I have made a systematic survey. But it seems to me that there are such people.

How are we to account for them? Religions tend to claim that they are in possession of certain necessary conditions for realizing a life of this sort. And, at least in the case of traditional Christianity, that among the necessary conditions is a full-blooded belief in the reality of the events told of in the Christian story. But if one can find saints who do not believe in this way, who "think differently," in different categories, perhaps, then it seems that this cannot be a necessary condition.

I am sure I cannot tell you in any detail what the necessary and/or sufficient conditions for "duplication" in a person's life are. But I am quite convinced that it is easier for some people to achieve than for others. And I am reasonably sure that being brought up in a loving, accepting family, where high standards are both exhibited and expected, but where forgiveness "covers a multitude of sins," is one of the chief things that makes it easier. If one is accepted and accepting of oneself, it is, for one thing, much easier to be reasonable. Adoption of the impartial moral point of view is difficult for one driven by anxieties, fears, and desperation.

This suggests that for those who have never known that sort of caring environment, who feel themselves unloved and unlovable, it may be that a belief in God who loves them while they are yet sinners, and who sent his Son to die for them, may be the only thing that can transform their wretched lives. Such a person may well experience a need than which no greater can be conceived. To such a need nothing will answer but a love than which no greater can be conceived. And I would not for the world, nor do I think you should, ridicule such a need and an answer offered by religion to meet such a need.

I have been focussing on the good religion can do. And I have seen it do great good. But we must not forget that it can do great evil as well. It might be said that there is one feature of traditional religion that cannot be captured in a "naturalized" religion such as that proposed by Professor Campbell. It provides us with a transcendent source of criticism for all partial and limited views, and so frees us from idolatries of various sorts.

But what is to prevent people from identifying as transcendent what is merely their current view of the transcendent? A temptation, surely, to which the religious are subject, and to which they have succumbed often enough. Here, I think, is the main source of the great evil that religions are capable of. They use the notion of transcendence, but identify it with their current views, which they accept on authority. Once that identification is made, they cannot conceive that there might be any further court of appeal. Certain, then, that they are possessed of the truth, it is but a small step to the persecution of critics, heretics, and unbelievers who -- if they do not see what seems to evident to the believers -- must be refusing to see, and so can be pronounced wicked.

Better the open, tentative, groping approach of independent inquiry, which is willing to admit that even the most confidently held beliefs may be overturned by the future course of that same kind of inquiry. Such an attitude keeps us alert, allows for correction and improvement in our views, and produces a modesty about our beliefs that seems appropriate to creatures such as we are. But more than that, it allows us to criticize pretensions to transcendence which are nothing but masks for self-interest and other limited ends.

I am not persuaded that we should modify our inherited religious language in the direction Professor Campbell suggests, though you might guess that I am sympathetic to the motivation behind these suggestions. I am not eager to replace religion as we have it. For one thing, proposals for such replacement have a history of just adding one more sect to the many we have now. And for another, the naturalistic attempts I have seen lack the power of the traditional representations of the transcendent. They are thin, pale reflections, not likely to do anyone much good. What do they offer, after all, which can compare to the glories of the Gothic cathedral, to the paintings of Michelangelo, to Bach's St. Matthew Passion -- let alone to the Biblical stories of Abraham, Moses and Jesus? These are our heritage. And it is much better, in my view, to retain traditional Judaism and Christianity, despite their conflict with the scientific world view. Let them do the good they are capable of. And let us who cannot accept these religions as authoritative answers to our questions of what the world is like, appreciate the power and the glory of their representation of that moral transcendence which we need in no way repudiate.